heating products

dualstream water control

Technical and Installation manual

All Models

For owners, installers and service engineers

ISO 9001 REGISTERED FIRM

WRAS APPROVED PRODUCT

Important Health and Safety Information for Installers and Service Engineers

Health and Safety at Work Act 1974

Consumer Protection Act 1987

COSHH Regulations 1988

The following information is given as a requirement of the above legislation.

Great care is taken by GAH (HEATING PRODUCTS) LIMITED to ensure that Dualstream systems are designed and manufactured to meet general safety requirements when properly used and installed as recommended in this manual.

It is the responsibility of Users and Engineers to ensure that adequate protective clothing and glasses are worn when working with the Dualstream system.

SEALS AND INSULATION

Insulation and sealing materials are used in the construction of the Dualstream cylinders. Units are sealed and when used in the manner for which they are intended the insulating and sealing materials do not present any known hazard. However always observe the following recommendations:-

1. Avoid inhalation of fibres or dust, wear face mask.

2. Avoid eye contamination by fibres or dust - wear eye protection.

3. As far as possible avoid any skin contact with Fibreglass Insulation, Glass Rope, Mineral Wool, Insulation Pads and Ceramic Fibre.

OTHER MATERIALS

SEALANTS, ADHESIVES AND PAINTS

Sealants, Adhesives and Paints are used in the construction of the Dualstream components. When used in the manner for which they are intended they do not present any known hazard.

ELECTRIC

All cylinders have electrical supply of 240V (enough to endanger life) connected to the Immersion Heater.

Always isolate before adjustment, servicing and repair.

All electrical installation and maintenance of the Dualstream must be carried out by a competent qualified installer.

All electrical work must be installed to the requirements of these 'User and Installation Instructions'.

GAH (HEATING PRODUCTS) LIMITED will not accept responsibility for any damage or personal injury caused by not giving due consideration to the above safety recommendations.

In pursuance of a policy of constant development, GAH (HEATING PRODUCTS) LIMITED reserve the right to change any boiler part or design without notice, therefore certain details included in this manual may not be correct at the time of printing. Any modification and improvements detailed in this manual does not commit GAH to update any system previously supplied.

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Patents GB 2349908
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Dualstream is a Trademark of GAH (HEATING PRODUCTS) LTD.

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Manual by Harber Technical Services Tel/Fax 01986 781605
E-mail:info@harbertech.co.uk www.harbertech.co.uk

GAH (Heating Products) Ltd.
Building 846
Bentwaters Parks
Rendlesham
Woodbridge
Suffolk IP12 2TW

Tel: 01394 421160
Fax: 01394 421170
email: mail@gah.co.uk
www.gah.co.uk

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1 INTRODUCTION

2 OPERATOR CONTROLS

3 TECHNICAL INFORMATION

4 INSTALLATION

5 COMMISSIONING

6 SERVICING

7 FAULT FINDING

IMPORTANT
BEFORE STARTING THE INSTALLATION OF THE DUALSTREAM CHECK ALL COMPONENTS HAVE BEEN DELIVERED AND ARE IN SATISFACTORY CONDITION.

1

1-1 Introduction

Dualstream Systemss are protected by patent GB 2349908

Coldstream is a Trademark of GAH (HEATING PRODUCTS) LTD.

This Handbook has been compiled to assist in the Installation and Operation of GAH (HEATING PRODUCTS) LIMITED Dualstream domestic hot and cold water system.

Please Ignore 'Installation and Operating Instructions ref. 620-0027C' supplied with Accumulator.

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After installation the Installer of the system should give full operating instructions to the householder for the Dualstream System.

1-1.1 The Dualstream System

Note

It is recommended to obtain the nominal mains pressure and flow rate before installing a Dualstream system, this will enable the optimum system to be configured to suit conditions.

The Dualstream systems by GAH Heating Products have been developed as an advanced solution for domestic hot and cold water installations. A Dualstream system will increase the water volume and maintain the mains pressure to both the hot and cold supplies, even when more than one outlet is in use at the same time.

Dualstream has been designed to function on the minimum standard for domestic water supply as provided by local water authorities - which is 1 Bar at 9 litres per minute.

GAH offer full technical assistance and design service to enable the optimum Dualstream system to be configured to overcome situations where poor mains supply and pressure are considered a problem.

1-1.2 How the Dualstream system works

Note

Direct cylinder heated by immersion heater. Indirect cylinder heated by boiler (also has immersion heater).

The system mainly comprises:- an unvented direct or indirect cylinder, an accumulator (cold water storage vessel), a combination valve and an expansion relief valve.

The accumulator has an internal controlled butyl diaphragm, incoming cold water is stored within this diaphragm at mains pressure. The air space between the diaphragm and the accumulator case is pressurised, this balances the supply and maintains pressure to the unvented hot water cylinder and cold outlets. When hot and cold water outlets are turned on the stored water from the accumulator supplements water from the incoming main, this results in consistent pressure and flow to all taps, showers and baths even when outlets are used simultaneously. Pressure will be sustained for as long as the accumulator is holding suffficient volume of water.

Note

For components supplied with system refer to page 24.

1-1.3 System Comprises

1. An unvented hot water cylinder pre-plumbed with all valves and controls with easy access pipe connections for quick, trouble-free installation.
2. Cylinder Thermostat and Thermal Cut-Out Thermostat.
3. An accumulator (cold water storage) and associated fittings which can be positioned anywhere in the dwelling, outhouse or garage, refer to 4-2.6.
4. A Motorised Valve for connection to the heating systems flow to cylinder.

1-1.4 Dualstream System Features

1. All taps and showers are at maximum 'System Pressure'.
2. Provide increased water flow rate to both hot and cold water outlets.
3. Suitable for properties with very low mains flow rates (9 litres per minute).
4. Balanced Hot and Cold water supply pressures.
5. Minimum pressure drop when more than one tap is in use.
6. More than 25% less pipework than traditional systems.
7. No loft storage tank - no risk of water stagnation.
8. Completely sealed system - wholesome water to all cold taps.
9. No tank filling noise.
10. Dualstream utilises GREEN TECHNOLOGY.

1-2 System Layout

1-2.1 Standard System

All installations must comply with relevant regulations - refer to section 4-1.

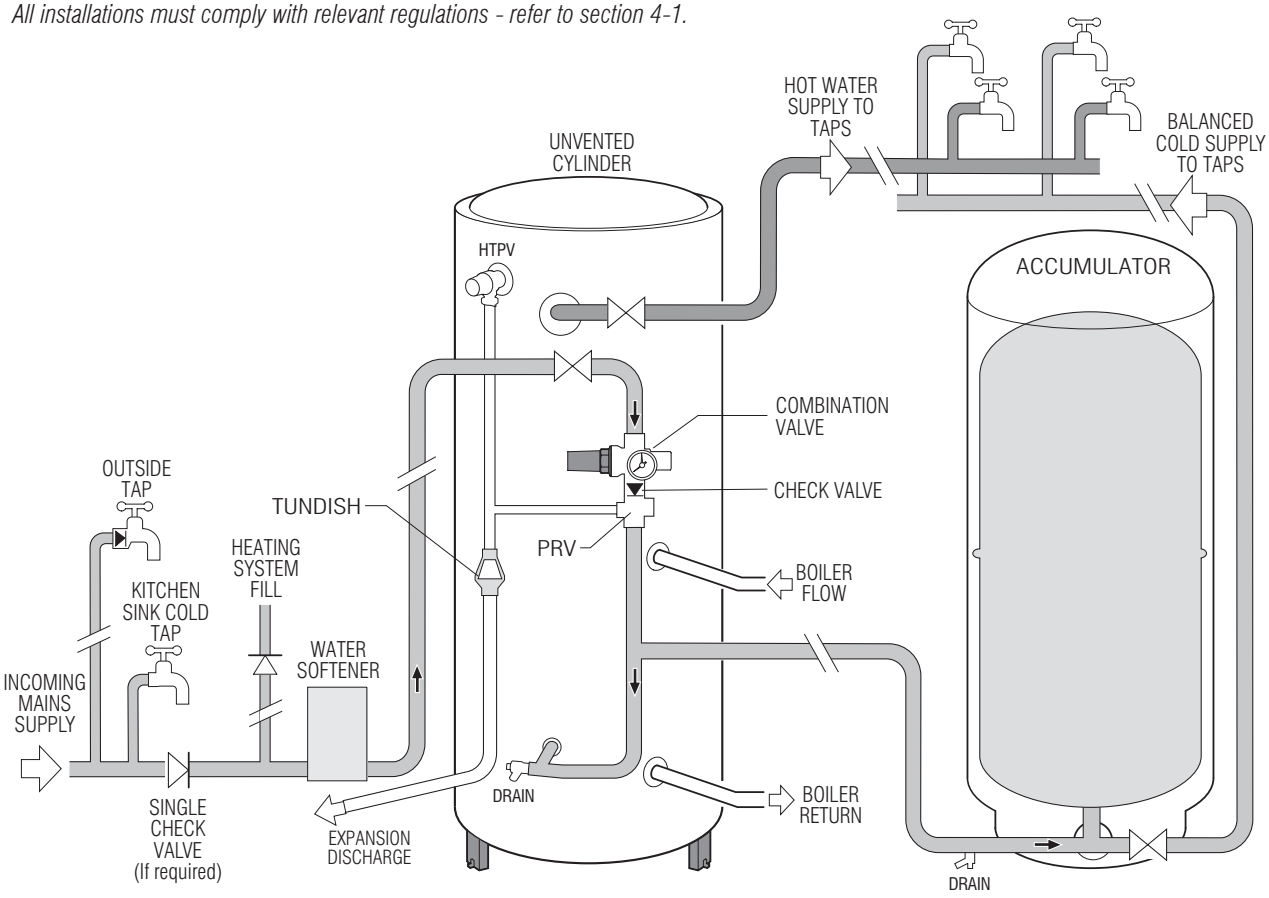


Fig. 1-2a Schematic Installation - Standard Arrangement

Fig. 1:2a shows a typical configuration of a Dualstream system when the accumulator and hot water cylinder can be installed within close proximity of each other.

This installation method allows for the accumulator to take up expansion from the unvented cylinder, no further expansion vessels are required.

Note

This layout will, in practice, be found to be the most efficient.

The incoming mains supply is connected to the Combination Valve which is factory assembled to the unvented hot water cylinder. The Combination Valve has an integral check valve. A Single Check Valve is supplied, this is only required to be fitted if back syphonage is possible from any item fitted prior to the Combination Valve.

Provision must be made, as applicable, for:- outside tap, boiler/heating system fill and water softener.

The Combination Valve limits the incoming pressure to 3.5 bar, it has an integral non return valve and pressure relief valve (PRV). Once passed the Combination Valve the incoming mains water supplies the accumulator and the cylinder.

Supply to all the cold taps and outlets is taken from the Tee fitting at the base of the accumulator.

Supply to the hot taps and outlets is taken from the cylinder in the traditional manner.

The cylinder HTP Valve and the combination valve PRV should be plumbed to the tundish (supplied), installation must comply with building regulations.

Three full bore lever valves are supplied, it is recommended to install these, one each:- incoming mains to combination valve, hot supply from cylinder, cold supply from accumulator.

1-2.2 Alternative Layout

All installations must comply with relevant regulations - refer to section 4-1.

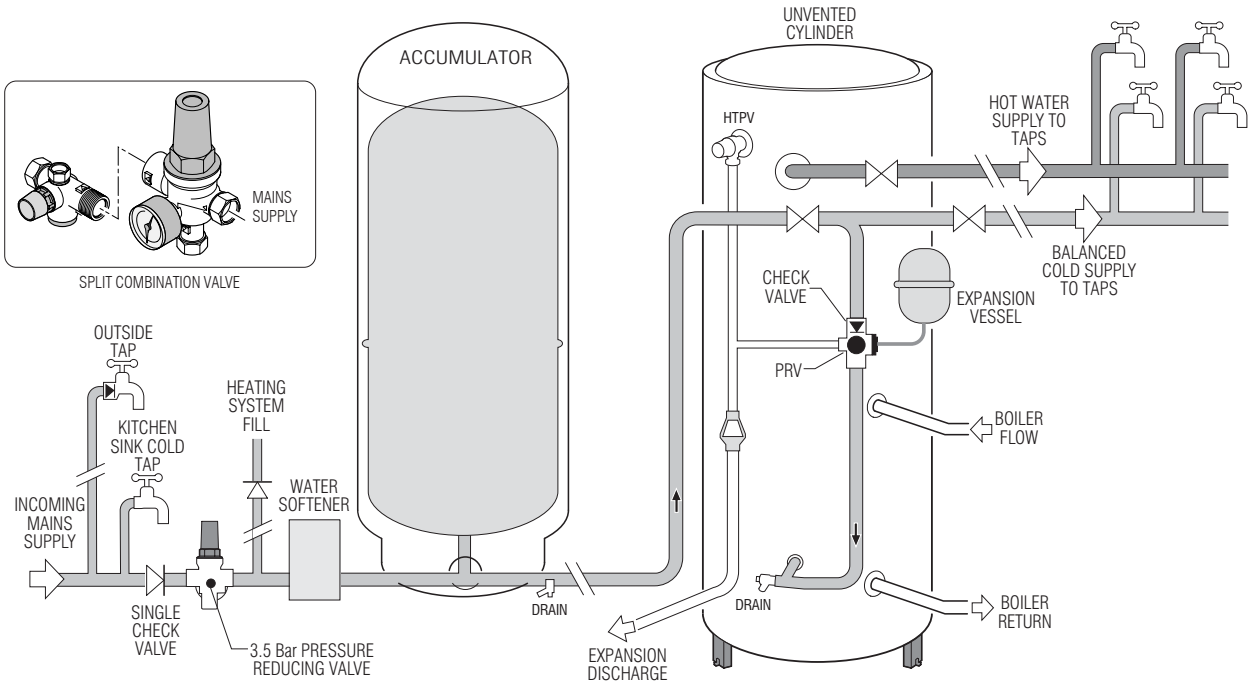


Fig. 1-2b Schematic Installation - Alternative Arrangement

Note

The expansion vessel is not supplied with the Dualstream system. GAH Heating Products can supply expansion vessels if ordered with the Dualstream system.

Fig. 1:2b shows a typical configuration of a Dualstream system when the accumulator has to be installed at a distance away from the hot water cylinder.

The Combination valve is supplied factory assembled to the unvented hot water cylinder. For this configuration it is recommended to split this valve and fit the 3.5 bar pressure reducing part of the valve on the incoming mains supply immediately after the single check valve. The PRV/non return valve part should be re-fitted to the cylinder as supplied.

This installation method does not allow for the accumulator to take up expansion from the unvented cylinder, therefore a suitably sized independant expansion vessel must be fitted. This should be connected to the 6 Bar port of the PRV/non return valve part of the combination valve at the cylinder..

The incoming mains supply is connected to the accumulator. Provision must be made between the single check valve and the accumulater for:- outside tap, boiler/heating system fill and water softener, as applicable.

The cold supply from the accumulator is connected to the PRV/non return valve, once passed this the incoming water supplies the accumulator and cylinder.

Supply to all the cold taps and outlets is taken from the T fitting located under the PRV/non return valve.

Supply to the hot taps and outlets is taken from the cylinder in the traditional manner.

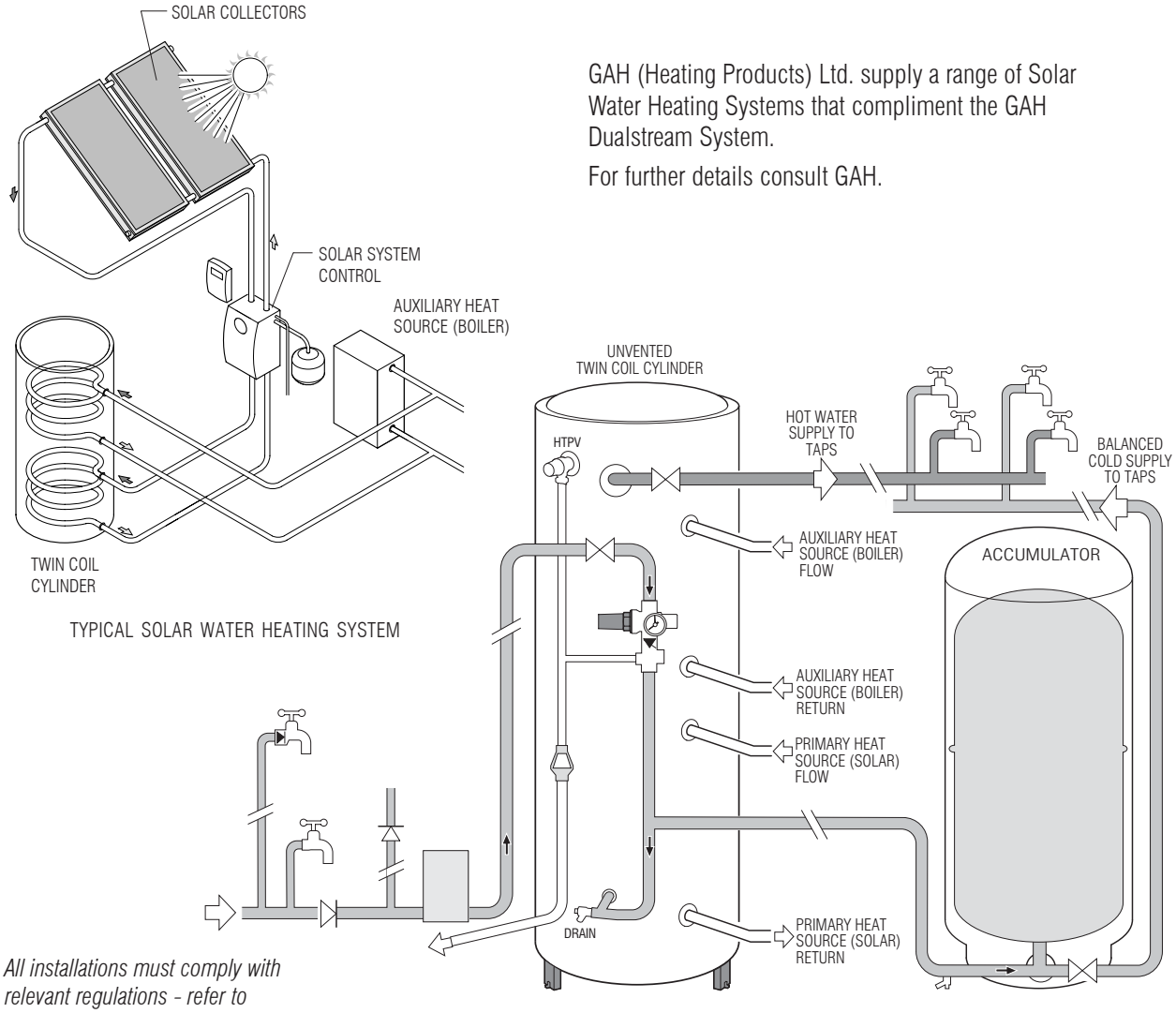
The cylinder HTP Valve and the combination valve PRV should be plumbed to the tundish (supplied), installation must comply with building regulations.

Three full bore lever valves are supplied, it is recomended to install these, one each:- incoming mains to the PRV/non return valve, hot supply from cylinder, cold supply to taps.

1-2.3 Typical Twin Coil Cylinder Layout

GAH (Heating Products) Ltd. supply a range of Solar Water Heating Systems that compliment the GAH Dualstream System.

For further details consult GAH.



All installations must comply with relevant regulations - refer to section 4-1.

Fig. 1-2c Twin Coil Cylinder Application

1-3 System Requirements

1-3.1 Sizing of System

The size of the Dualstream system is determined by the capacity of the accumulator and cylinder models selected. As the accumulator provides the pressure for the system it is important that this is of adequate size.

The accumulator water content is up to 65% of its gross volume.

Note

The accumulator model is designated as its gross volume, the actual water content of the accumulator is up to 65% of its gross volume.

When sizing the Dualsteam system close consideration should be given to the following:-

1. Incoming mains supply pipe size.
2. Incoming mains flow and static pressure.
3. House type, building height and number of occupants.
4. Typical daily water usage and peak demands.
5. Number of bathrooms and total number hot and cold water outlets
6. Types of shower, taps and baths and the volume and pressure of water to operate them.

The following chart is given as a guide only.

Size of Dwelling	Flat Smaller House	Small House	Medium House	Larger House	Large House
Usage	Kitchen 1-2 Bedrooms 1 Bath & Shower	Kitchen Cloakroom 2-3 Bedrooms 1 Bath & Shower	Kitchen, Cloakroom 4-5 Bedrooms 2 Baths & Showers	Kitchen, Cloakroom Utility Room 4-6 Bedrooms 2 Baths & Showers	Kitchens, Cloakrooms Utility Rooms Multiple Beds 4-5 Baths & Showers
Preferred Accumulator Model	100 200 240	200 240 300	240 300 500	300 500	500 2 x 500
Preferred Cylinder Size	125	150	210 250	250 300	500 2 x 500

Note

The accumulator model is designated as its gross volume, the actual water content of the accumulator is up to 65% of its gross volume.

GAH offer full technical assistance and design service to enable the optimum Dualstream system to be configured to overcome situations where poor mains supply and pressure are considered a problem.

1-3.2 Central Heating System

The Dualstream system does not affect the central heating installation. However consideration has to be given to the best method of connection and control of the heating system to the indirect cylinder.

1-3.4 Scale Protection

IMPORTANT All installations should have a scale protection device fitted and in areas known to have hard water, a water softening device is strongly recommended.

GAH offer a range of quality Water Softeners, for information contact GAH (HEATING PRODUCTS).

GAH recommend and promote the use of scale prevention devices and water softeners in areas that are known to have hard water. Installed correctly they prolong the life of equipment and help prevent lime-scale formation in the pipework. Water Softeners provide the advantages of soft water, as well as preventing scale build up on taps and shower heads.

Water softeners and any mains fed system must be of adequate capacity and should be installed with suitably sized hoses to prevent any possibility of flow reduction.

1-3.5 Frost Protection

When planning the installation location of both the accumulator and the unvented cylinder consideration must be given to the risk of frost and the use of frost protection.

The design of the accumulator gives it a degree of frost protection enabling it to be located within the dwelling,loft space or garage without further protection.

The cylinder can also be installed within the dwelling or loft space without further protection.

Cylinders or accumulators must have frost protection when they are installed where low temperatures could be a potential problem. Cylinders can be protected by a frost thermostat.

To comply with Building Regulations all necessary pipework must be suitably lagged.

2-1 Hot Water Temperature - Heating System

Note
For 500 Cylinders see 2-2.2.

2-1.1 Hot Water Control - Heating System

When the hot water is heated by the heating system the temperature of the hot water at the taps is controlled by the Cylinder Thermostat. This controls a motorised valve that opens and closes the flow from the heating system.

The temperature range is 30°C to 85°C.

Recommended setting is 60°C.

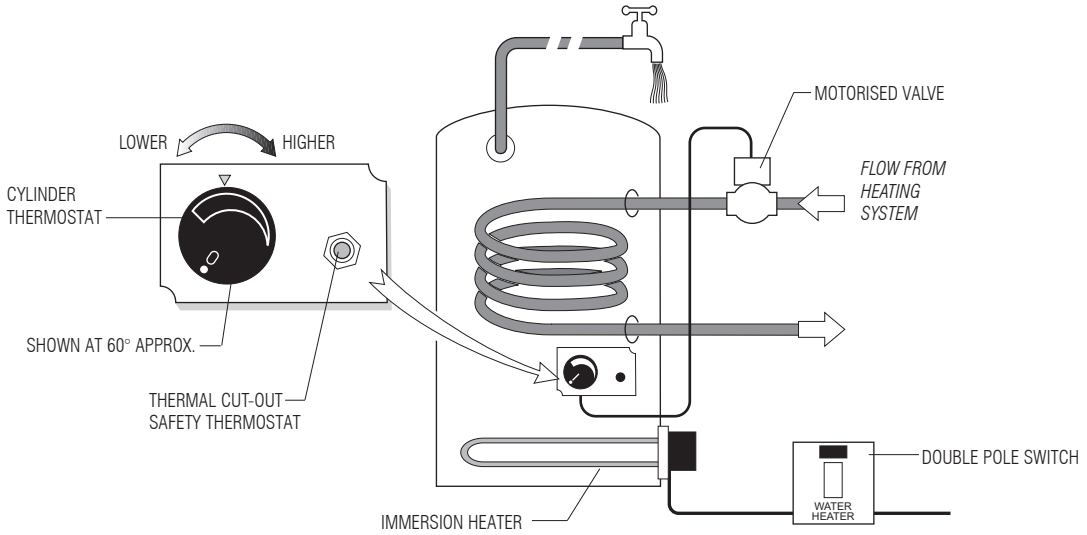


Fig. 2-1a Typical Hot Water Control

2-2 Hot Water Temperature - Immersion Heater

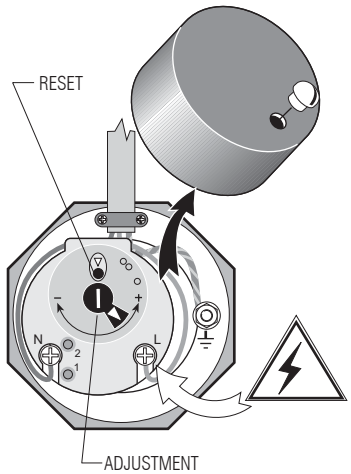


Fig. 2-2a Immersion Heater Thermostat

2-2.1 Hot Water Control 125, 150, 210 & 300 Cylinders

When the hot water is heated by the electric Immersion Heater the temperature of the hot water at the taps is controlled by the Immersion Heater Thermostat. This is located under the black Immersion Heater cover.

The temperature range is 30°C to 85°C.

Recommended setting is 60°C.

Fig. 2-2a shows the approximate setting position for 60°C.

The Immersion Heater has a Thermal Cut-Out, refer to 2:3.1.

WARNING
ALWAYS ISOLATE THE IMMERSION HEATER BEFORE REMOVING COVER.
When the cover is removed electrical live terminals are exposed.

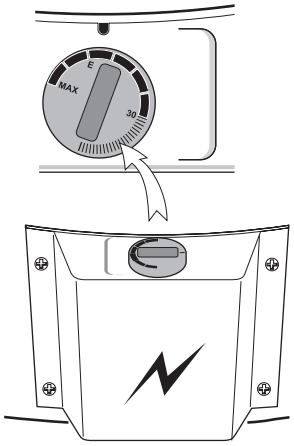


Fig. 2-2b 500 Immersion Heater Adjustment

2-2.2 Hot Water Control - 500 Cylinders

When the hot water is heated by the electric Immersion Heater the temperature of the hot water at the taps is controlled by the Immersion Heater Thermostat which has an adjusting knob located on top of the plastic Immersion Heater cover.

The temperature range is 30°C to 85°C.

Recommended setting is 60°C.

2-3 Hot Water Overheating

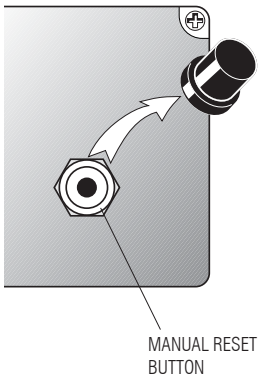


Fig. 2-3a Thermal Cut-Out Thermostat

2-3.1 Water Heated by Heating System

When the hot water is heated by the heating system a Thermal Cut-Out Thermostat prevents the water within the cylinder overheating.

In the event of the water temperature within the cylinder reaching 90°C the thermostat will trip and close the motorised valve shutting off the flow from the heating system - see fig. 2-3a.

The Thermal Cut-Out Thermostat is a manual reset type, this means it has a button that pops out when the thermostat has been tripped by overheating.

To reset the system after overheating allow time for the water to cool, or run off some hot water, then remove the plastic cap and press the Thermal Cut-Out Thermostat manual reset button.

If the Thermal Cut-Out Thermostat trips more than once, switch off the heating system and Immersion Heater and contact your installer.

2-3.2 Water Heated by Immersion Heater

When the hot water is heated by the Immersion Heater its integral Thermal Cut-Out Thermostat prevents the water within the cylinder overheating.

The Immersion Heater Thermal Cut-Out Thermostat is a manual reset type, this means it has a small button that pops up when the thermostat has been tripped by overheating.

To reset the system after overheating switch off the Immersion Heater, allow time for the water to cool, or run off some hot water.

WARNING
ALWAYS ISOLATE THE IMMERSION HEATER BEFORE REMOVING COVER.
When the cover is removed electrical live terminals are exposed.

If the Immersion Heater Thermal Cut-Out Thermostat trips more than once, switch off the Immersion Heater and contact your installer.

To reset 125,150, 210 & 300 Cylinders

Isolate the Immersion Heater.

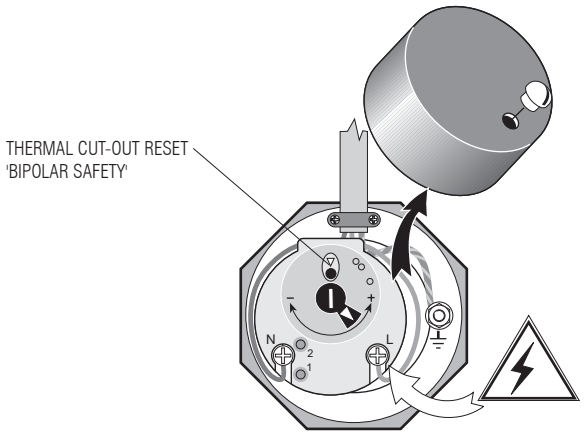


Fig. 2-3b 125, 150, 210 & 300 Immersion Heater Thermal Cut-Out

Remove the Immersion Heater cover and using a small screwdriver, press the 'Bipolar Safety' reset button - see fig. 2-3b.

To reset 500 Cylinder

Isolate the Immersion Heater.

Remove the Immersion Heater cover and using a small screwdriver, press the 'S' reset button - see fig. 2-3c.

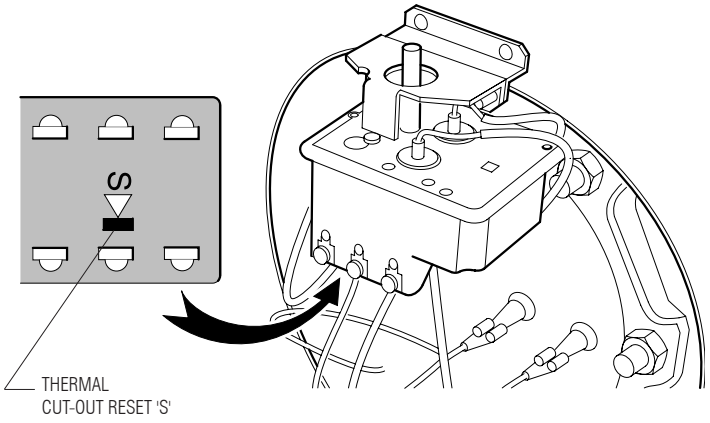


Fig. 2-3c 500 Immersion Heater Thermal Cut-Out

2-4 Shut Off Valves

The Dualstream installation will have a number of shut off valves, the location of these will be dependent on the installation - fig. 2-4a shows a typical layout.

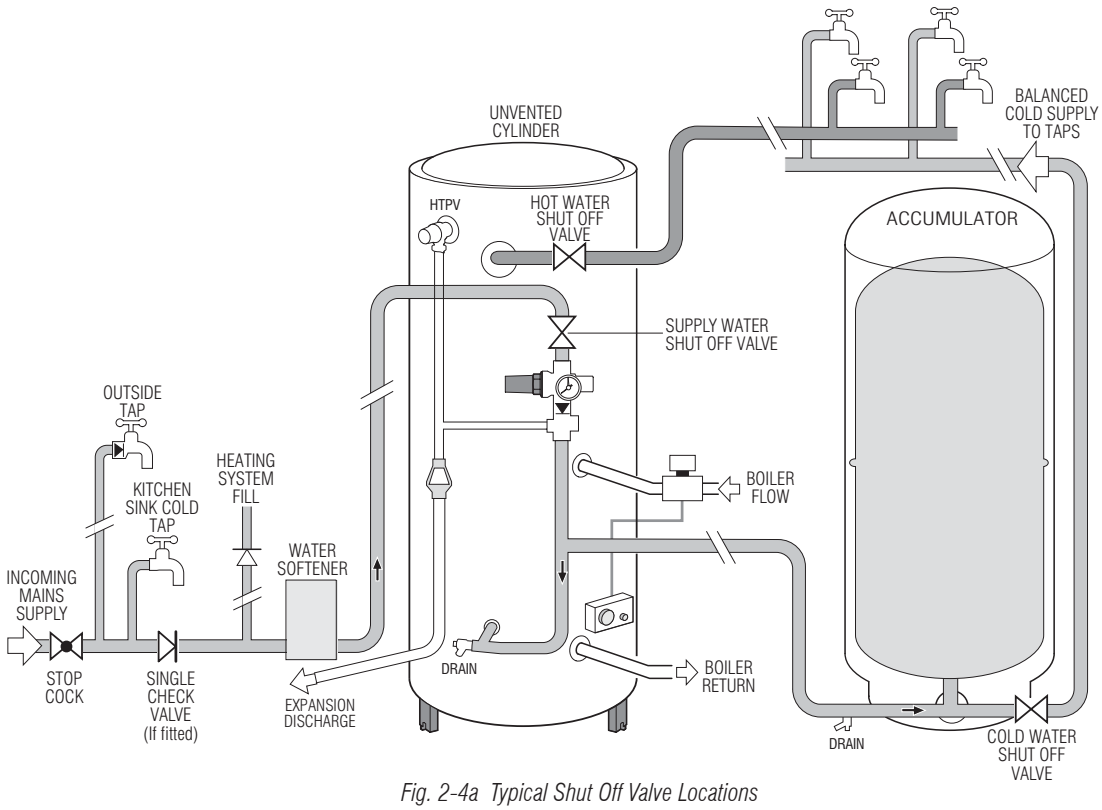


Fig. 2-4a Typical Shut Off Valve Locations

IMPORTANT Before closing ANY valve:-
1. Switch OFF the Electric Immersion Heater.
2. Turn OFF the Heating System.

2-4.1 Stop Cock

Normally located at the point where the mains supply enters the dwelling.
Shuts off the mains water supply to the dwelling.

Note
When opening the stop cock turn the valve fully open then close ½ turn, this prevents the valve sticking.

2-4.2 Single Check Valve (If fitted)

Normally located after the Stop Cock. Prevents water backfeeding to main.
Shuts off the mains water supply to the dwelling.

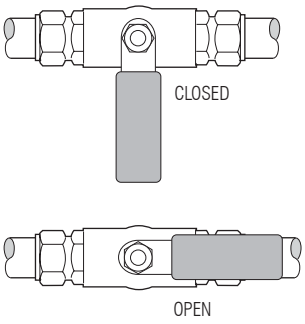


Fig. 2-4b Valves

2-4.3 Cold Water Shut Off Valve

Normally located in the cold feed close to the accumulator.
Shuts off the cold water to the taps.

2-4.4 Supply Water Shut Off Valve

Normally located where the cold supply connects to the combination valve on the cylinder.
Shuts off the cold supply to the Dualstream system.

2-4.5 Hot Water Shut Off Valve

Normally located where the Domestic Hot Water feed comes from the cylinder.
Shuts off the hot water to the taps.

2-5 Expansion Relief

Note
At least the Tundish or discharge pipe should remain in view, do not box in or cover up either.

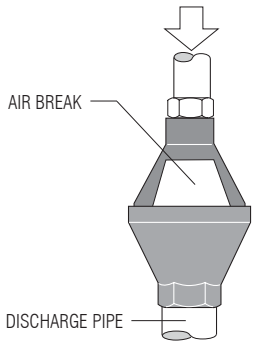


Fig. 2-5a Tundish

Note
For more information see 4-3

The Dualstream installation has a TPR Valve normally mounted on the cylinder. In the event of the pressure within the system becoming too high, the TPR Valve will vent.

A Tundish will be fitted in the system, this should be located in the same space or compartment as the hot water cylinder. This device provides an air break when pressure is being vented.

When pressure is being vented water/steam will be evident at the Tundish and from the discharge pipe of the Tundish.

Water will normally only discharge when there is an increase in pressure caused by loss of air pressure in the accumulator.

In the event of water/steam being seen at the discharge pipe or Tundish do the following:-

1. Turn ON a hot tap to relieve the pressure.
2. Turn OFF the Electric Immersion Heater.
3. Turn OFF the Heating System.
4. Investigate possible cause for high pressure e.g:-
   - i Cylinder Thermostat is set too high.
   - ii Restriction in hot water pipework.
   - iii Loss of air pressure in the accumulator resulting in no expansion.
5. Contact the installer before restarting the system.

2-6 Servicing

It is recommended the system is inspected by an approved engineer once per year.

The service procedure is included in section 6-1.1.

2-7 Protech Anti-corrosion System - 500 only

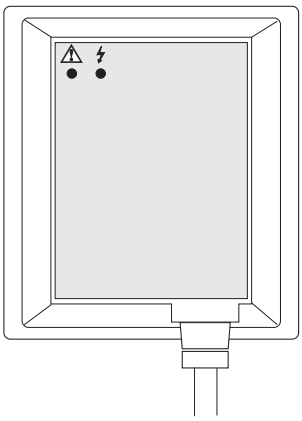


Fig. 2-7a Protech Unit

Fitted to TDI 500 & TDD 500 non stainless steel cylinders only.

The Protech unit is an electronic anti-corrosion protection system which improves the life of the cylinder.

The Protech unit must be permanently connected to a 240V supply at all times.

The unit has a RED and a GREEN light on the front.

The GREEN light should be on at all times, this indicates proper operation.

When the RED light is on it indicates improper operation which could be:-

1. A short circuit between the electrode and the cylinder.
2. One of the electrodes is not connected.
3. There is no water in the cylinder.

Consult the installer if the RED light is on.

3-1 Specifications

3-1.1 Cylinder

Maximum Water Supply Pressure ..... 6.0 Bar
Operating Pressure ..... 3.5 Bar
HTPR Valve ..... 7.0 Bar/90°C
Cylinder Thermostat ..... range 30°C to 85°C
Recommended Setting ..... 60°C max
Thermal Cut-Out ..... fixed @ 90°C
Immersion Heater .....
- Voltage 240V
- Direct 125, 150, 210, 300 ..... 2 x 3kW
- Indirect 125, 150, 210, 300 ..... 1 x 3kW
- 500 ..... 1 x 6kW
- Thermal Cut-Out ..... fixed @ 90°C

Motorised Valve V4303
Protech Anti-corrosion unit - TDI 500 & TDD 500 only (non stainless steel only) 240V 3amp

3-1.2 Accumulator

Membrane ..... Butyl for potable water
Maximum pressure ..... 7.0 Bar
Minimum pressure ..... 0.5/0.8 Bar
Factory set pressure ..... 2 Bar

3-1.3 Pipes

All pipes should be sized to suit application.

3-1.4 Electrics

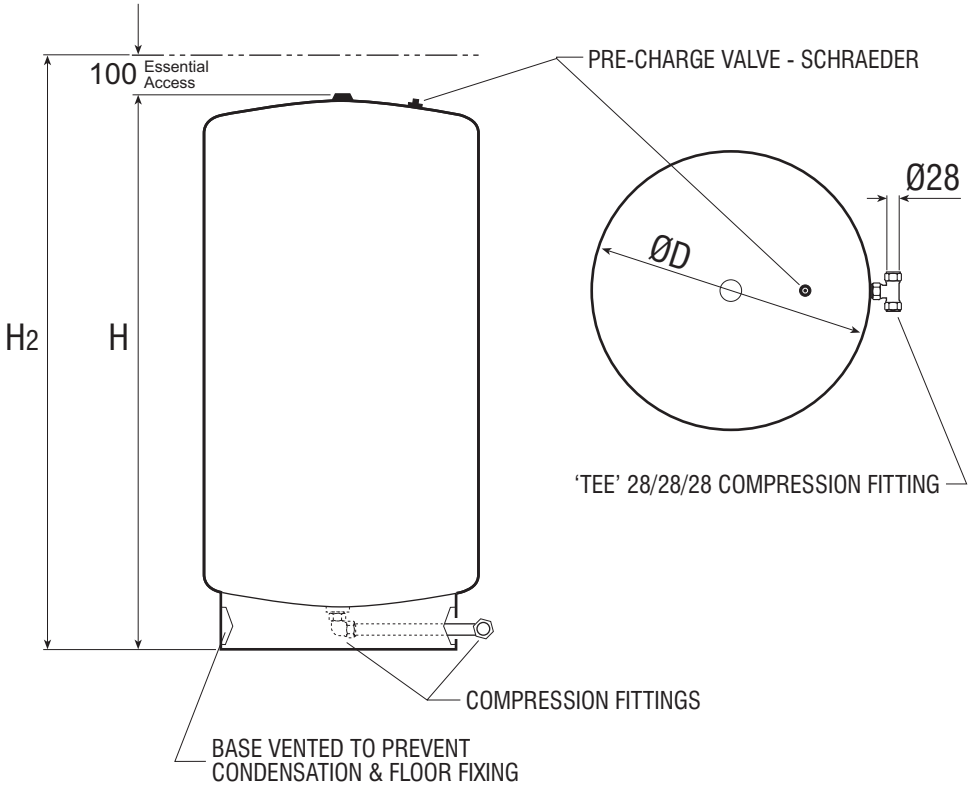
All systems are supplied for 240V SINGLE PHASE.

On 500 Cylinders the Immersion Heaters can be converted to 3 Phase - consult GAH (HEATING PRODUCTS) LIMITED for further information.

Cylinder model	Direct TDD125 TDD150 TDD210 TDD250 TDD300	Indirect TDI125 TDI150 TDI210 TDI250 TDI300	Indirect TDI500
Immersion Heater Size	240V 2 x 3kW	240V 1 x 3kW	240V 6kW
Recommended Fuse Rating	2 x 13 amp	13 amp	30 amp
Recommended Cable Size	2 x 2.5mm²	2.5mm²	6.0mm²
Protech	N/A	N/A	240v
Protech Recommended Cable Size	N/A	N/A	1.5mm²
Protech Recommended Fuse Rating	N/A	N/A	3 amp

3-2 Dimensions

3-2.1 Accumulator Dimensions



Accumulator Model	Size (Gross Capacity)	*Maximum Water Content	ØD	H	H2 Recommended minimum space required.	Weight Empty
100	100	up to 65 litres	410mm	890mm	990mm	16.3kg
200	170	up to 110 litres	535mm	940mm	1040mm	30.4kg
240	240	up to 156 litres	535mm	1215mm	1315mm	37.2kg
300	310	up to 198 litres	535mm	1500mm	1600mm	44.5kg
500	450	up to 292 litres	668mm	1530mm	1630mm	69.5kg

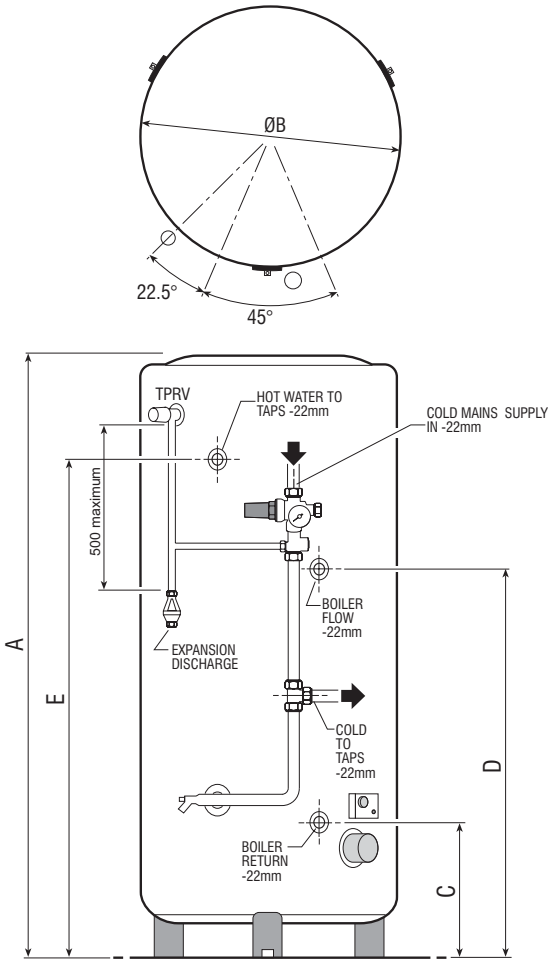
* Water content is up to 65% of the accumulator volume.

Total weight = weight empty + water content @ 1kg/litre.

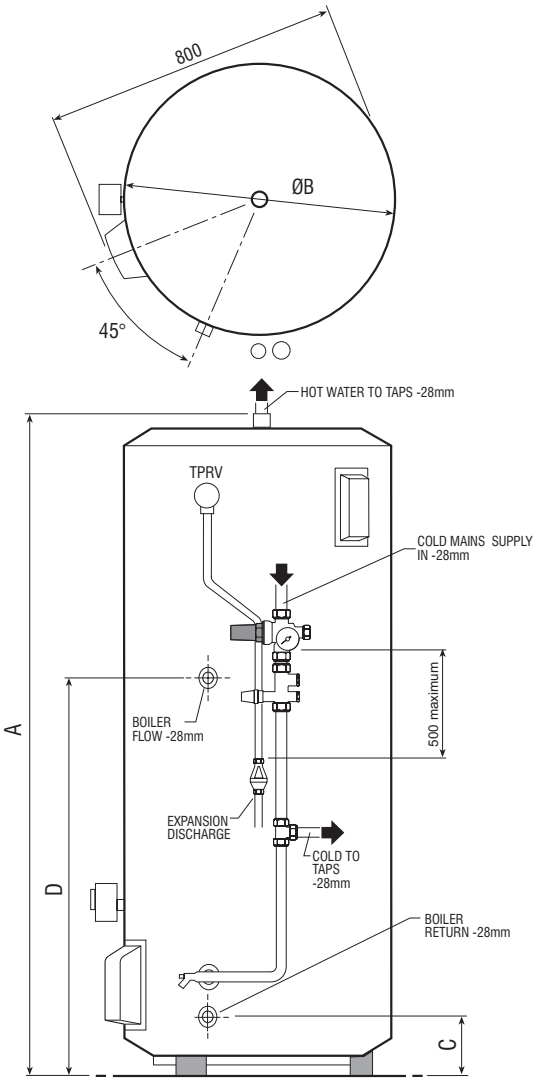
Fig. 3-2a Accumulator Dimensions

3-2.2 Standard Direct and Indirect Cylinder Dimensions

COMPRESSION FITTINGS ARE SUPPLIED TO ADAPT THE CYLINDER TAPPINGS TO THE PIPE SIZES SHOWN.



125,150, 210 & 300 CYLINDERS



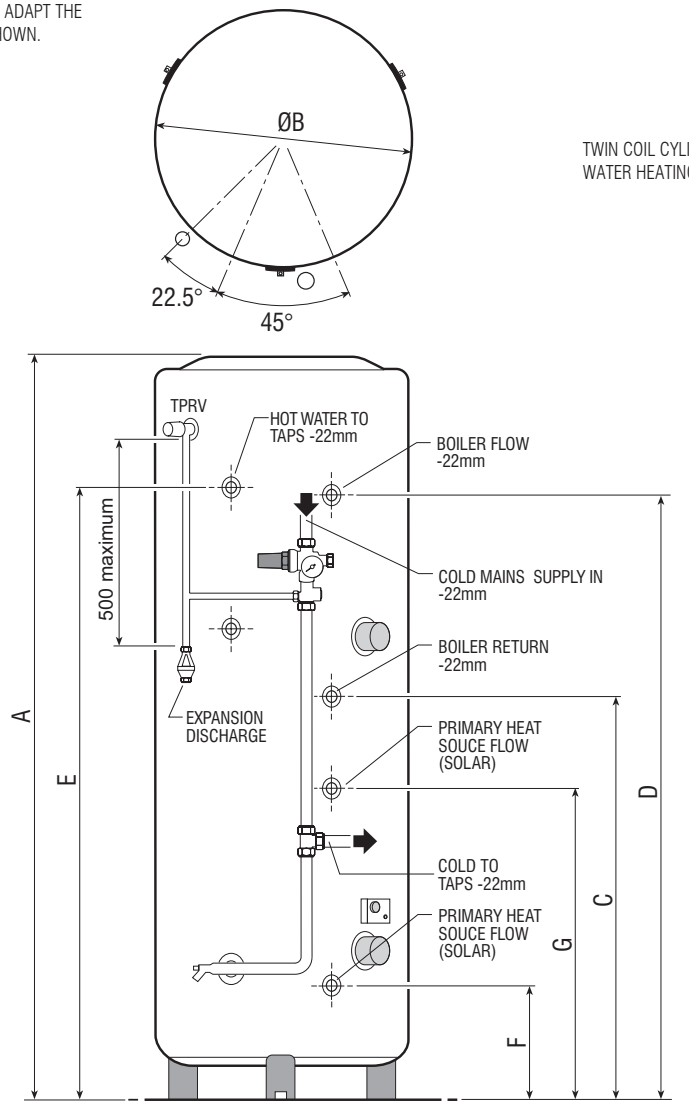
500 CYLINDERS

	Cylinder Model	Capacity	Coil Surface	Coil Rating	A	ØB	C	D	E	Weight Empty	Weight Full
INDIRECT	TDI 125	125 litres	0.75m²	20.5kW	1015	Ø505	225	625	747	25kg	150kg
	TDI 150	150 litres	0.9m²	26.7kW	1165	Ø505	225	765	905	30kg	180kg
	TDI 210	210 litres	0.9m²	26.7kW	1495	Ø505	225	765	1221	40kg	250kg
	TDI 250	250 litres	1.5m²	31.8kW	1555	Ø560	255	795	1316	47kg	297kg
	TDI 300	300 litres	1.5m²	31.8kW	1795	Ø560	255	795	1551	50kg	350kg
	TDI 500	495 litres	1.5m²	31.8kW	1870	Ø714	230	700	-	149kg	641kg
DIRECT	TDD 125	125 litres	-	-	1015	Ø505	-	-	747	21kg	146kg
	TDD 150	150 litres	-	-	1165	Ø505	-	-	905	29kg	176kg
	TDD 210	210 litres	-	-	1495	Ø505	-	-	1221	36kg	246kg
	TDD 250	250 litres	-	-	1555	Ø560	-	-	1316	42kg	292kg
	TDD 300	300 litres	-	-	1795	Ø560	-	-	1551	44kg	344kg
	TDD 500	495 litres	-	-	1870	Ø714	-	-	-	130kg	630kg

Fig. 3-2b Standard Cylinder Dimensions

3-2.3 Indirect Twin Cylinder Dimensions

COMPRESSION FITTINGS ARE SUPPLIED TO ADAPT THE CYLINDER TAPPINGS TO THE PIPE SIZES SHOWN.



TWIN COIL CYLINDER ARE USED FOR SOLAR WATER HEATING APPLICATIONS SEE 1-2.3

Cylinder Model	DIMENSIONS						
	A	ØB	C	D	E	F	G
ITSI 210	1495	Ø505	806	1206	1221	225	625
ITSI 250	1555	Ø560	876	1276	1316	255	655
ITSI 300	1795	Ø560	1111	1511	1551	255	795

Cylinder Model	Capacity	Bottom Coil		Top Coil		Weight Empty	Weight Full
		Surface	Rating	Surface	Rating		
ITSI 210	200 litres	0.67m²	19.0kW	0.67m²	19.0kW	29kg	239kg
ITSI 250	250 litres	0.67m²	19.0kW	0.67m²	19.0kW	47kg	297kg
ITSI 300	300 litres	0.67m²	19.0kW	0.90m²	26.7kW	49kg	349kg

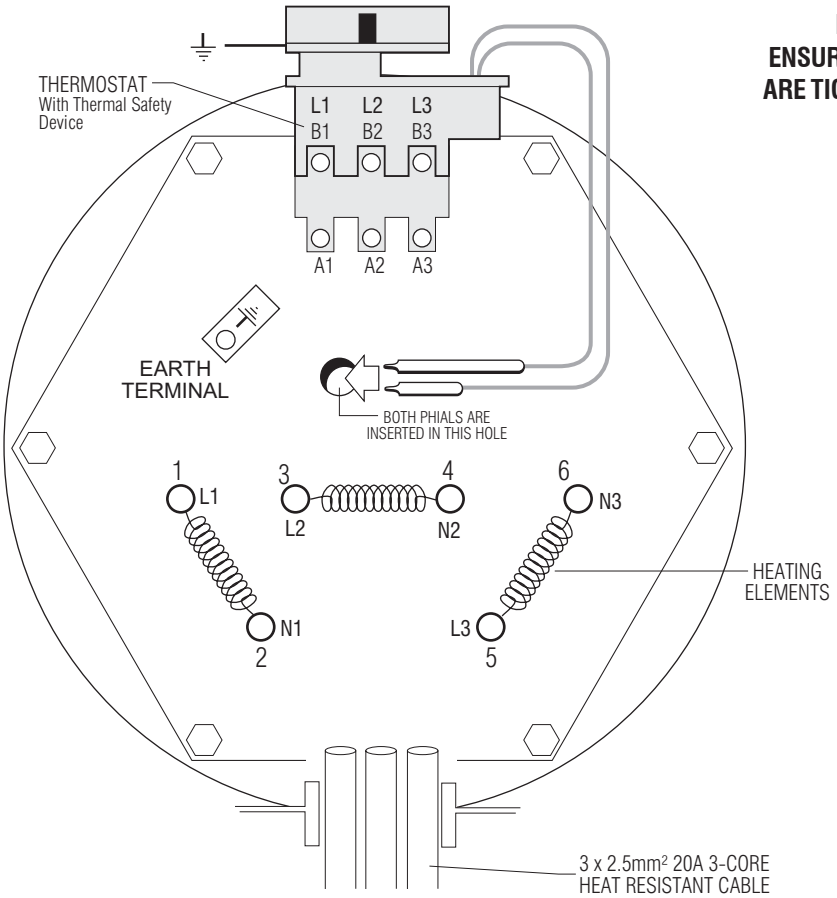
Fig. 3-2c Twin Cylinder Dimensions

3-3 Wiring

3-3.1 Immersion Heater - 500 Cylinders

500 cylinders have three 2kW immersion heater elements (total 6kW) and must be wired using 3 x 2.5mm² 20amp Heat Resistant Cables as shown.

IMPORTANT
ENSURE ALL TERMINALS ARE TIGHT AND CORRECT



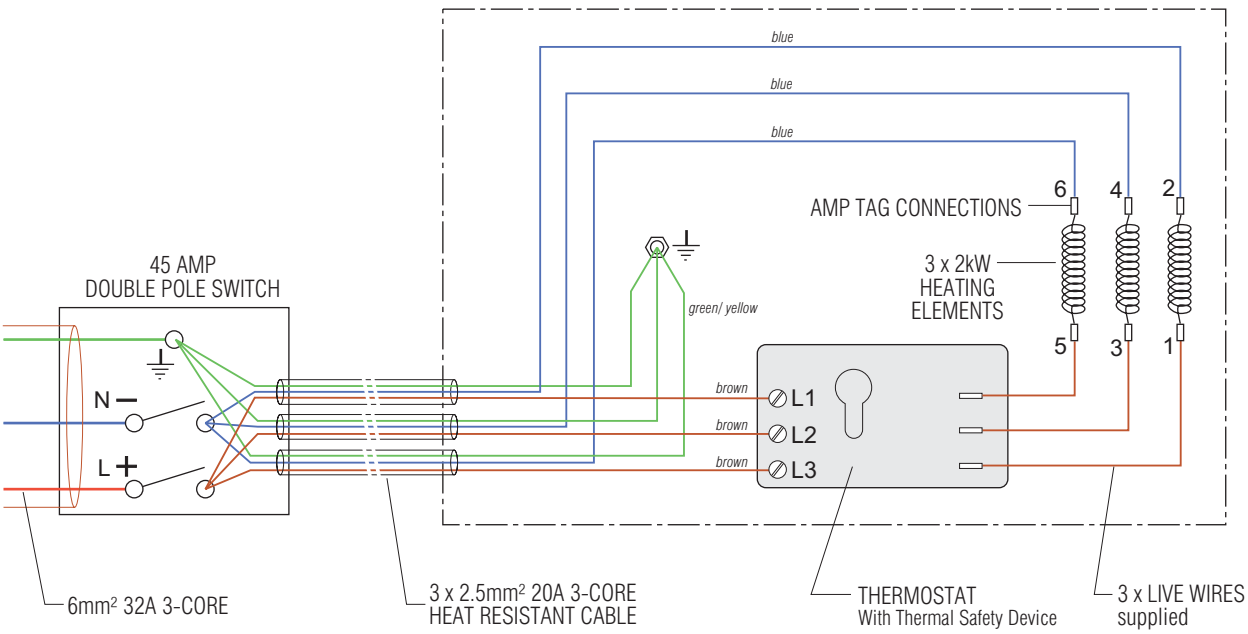


Fig. 3-3a Immersion Heater Wiring Diagram - 500 Cylinder

3-3.2 Immersion Heater - 125, 150, 210 and 300 Cylinders

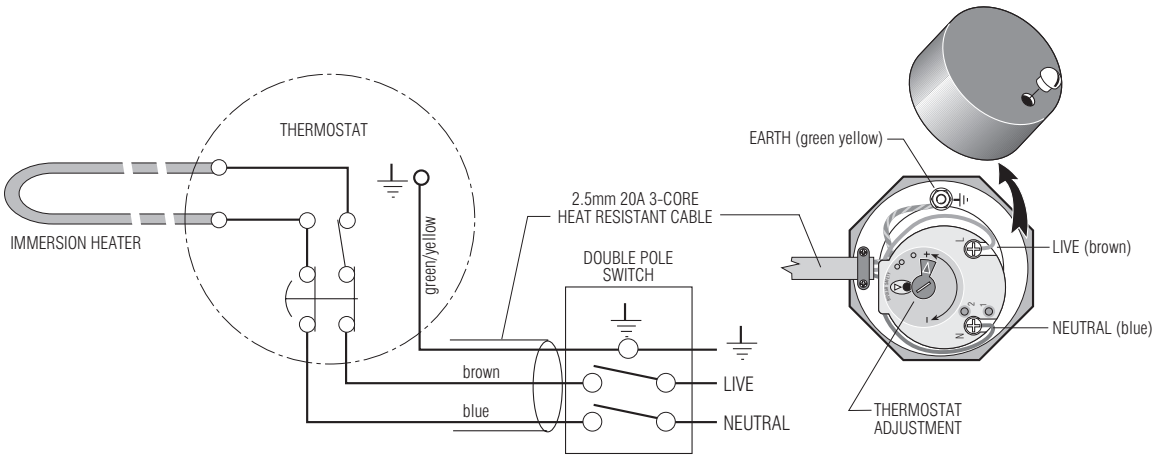


Fig. 3-3b Immersion Heater Wiring Diagram - 125, 150, 210 and 300 Cylinders

3-3.3 Cylinder Thermostats

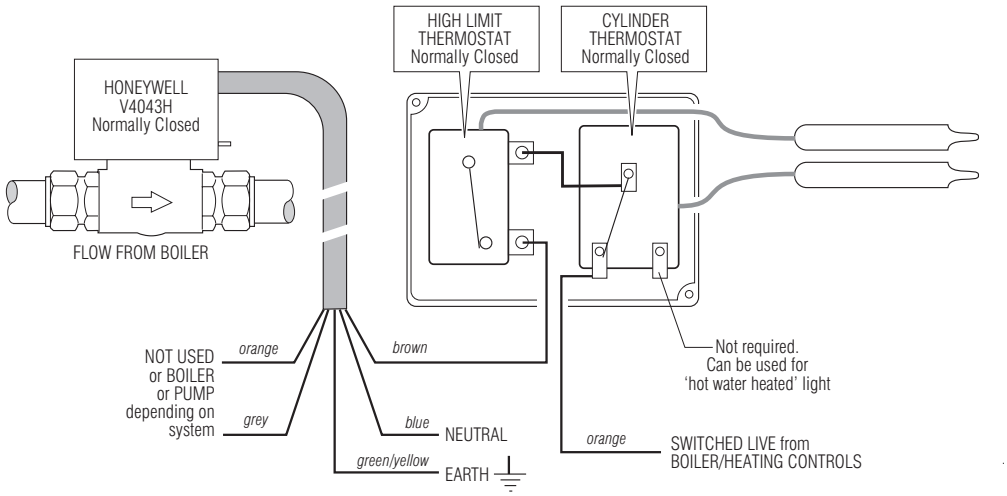


Fig. 3-3c Cylinder Thermostats Wiring Diagram - 125, 150, 210 and 300 Cylinders

3-3.4 Protech Anti-corrosion System (500 non stainless steel only)

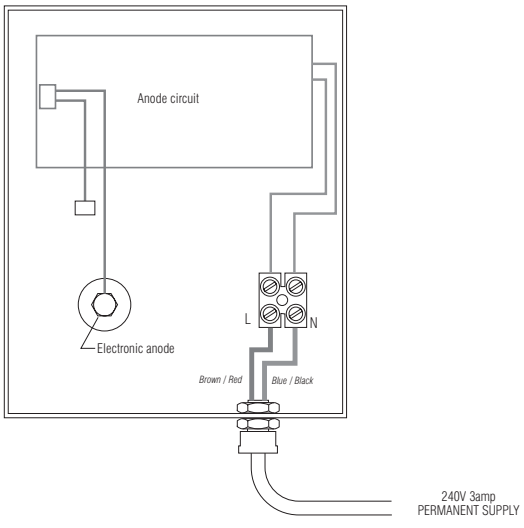


Fig. 3-3d Protech Anti-corrosion System Wiring Diagram

4-1 Building Control

Note
In some areas it is a criminal offence to install an unvented hot water storage system without notifying the local authority, or without the relevant licence.

To install a Dualstream System the installer must be fully competent, suitably qualified and hold a relevant unvented certificate and any applicable licence that may be required by the local inspectorate for installation of an unvented hot water storage system.

In some areas the Local Authority may require notification by means of a building notice or by the submission of full plans for the proposed installation of an unvented hot water storage system.

4-1.1 Regulations

The **Water Byelaws** and **Current Building Regulations** (paying particular attention to G3 and Part L 1 & 2) and **HSE** requirements should be considered when installing a Dualstream System.

Note
GAH offer full unvented training packages contact GAH (HEATING PRODUCTS).

4-1.2 Electrical Regulations

All wiring should carried out to and comply with the current IEE Wiring Regulations.

All electrical work must comply with any relevant regulations that apply at the time of the installation.

4-1.3 Electrical Work

All electrical installation and maintenance of the Dualstream must be carried out by a competent qualified installer.

All electrical work must be installed to the requirements of these 'User and Installation Instructions'.

4-2 Installation

4-2.1 Unvented Hot Water Cylinder

The cylinder may be installed at any convenient above ground location within the dwelling. As Dualstream is a sealed system, the cylinder is equally effective on any floor.

The cylinder must always be installed vertically.

Avoid positioning the cylinder where it may be subjected to frost.

The floor must give adequate support to the filled cylinder.

Cylinders with legs are supplied with self-tapping screws for floor fixing.

For maintenance purposes leave at least 500mm at the front of the cylinder.

The cylinder may be installed below ground i.e. in a basement, providing that the expansion relief discharge pipe is plumbed to a metal receptacle with a suitable pump and switch arrangement, current Building Regulations give details of this. An alternative is to use a Hepworth HepvO Self Sealing Waste Valve, this must be installed to the manufacturers specification and building regulations.

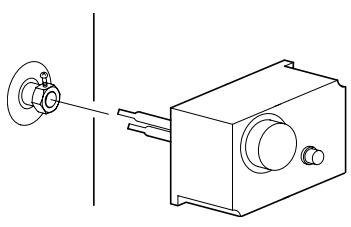


Fig. 4-2a Cylinder Thermostat

4-2.2 Cylinder Thermostat

The combined Cylinder Thermostat and Thermal Cut-Out Thermostat supplied should be inserted into the socket provided in the cylinder. A screw is provided to clamp the unit in place.

Wire the unit as wiring diagram 3-3c.

4-2.3 Combination Valve

The Combination Valve is supplied pre assembled with pipework to the unvented cylinder. For standard configurations as shown in 1:2.1 this should remain in situ.

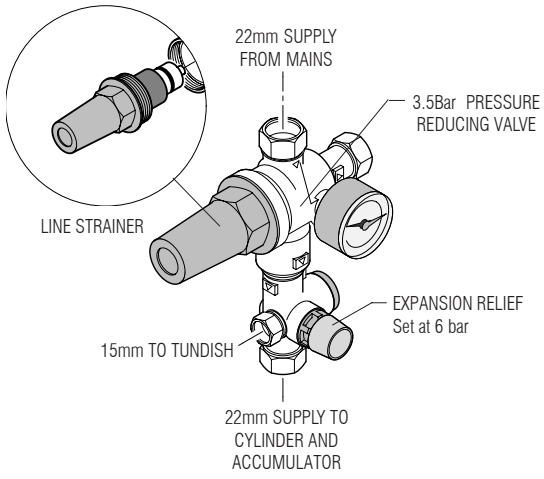


Fig. 4-2b Combination Valve - Cylinders 125,150, 210, 300

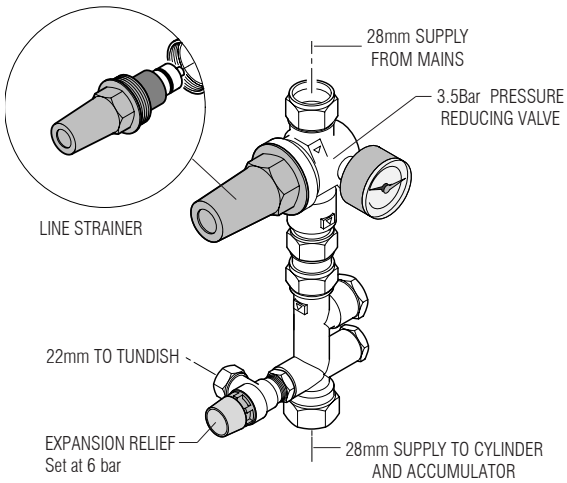


Fig. 4-2c Combination Valve - Cylinders 500

For alternative systems as shown in 1:2.2, it is recommended to split the Combination Valve and fit the 3.5 Bar Reducing Valve section onto the incoming mains supply as shown in fig 1:2b.

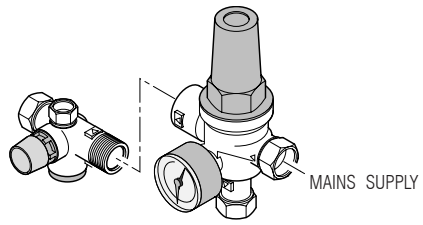


Fig. 4-2d Splitting Combination Valve - Cylinders 125,150, 210, 300

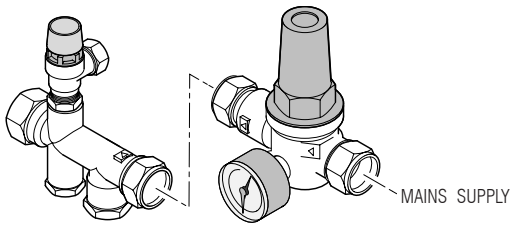


Fig. 4-2e Splitting Combination Valve - Cylinders 500

4-2.4 Expansion Vessel

As the Dualstream Accumulator acts as the system expansion vessel, an independent expansion vessel system is not normally required.

However, if the alternative Dualstream configuration shown in 1:2.2 is adopted or an independent expansion vessel (not supplied by GAH) is specified it should be fitted to the domestic hot water system.

It is recommended to connect the expansion vessel to the Combination Valve which has a ¾ BSP port provided for this. The expansion vessel must always be open to the system with NO shut off or isolation valves in the connection pipe.

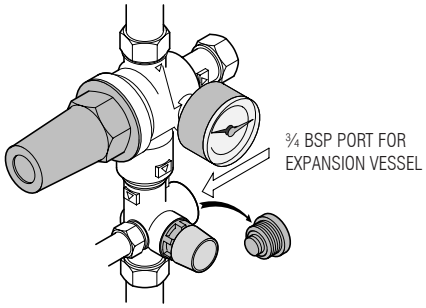


Fig. 4-2f Expansion Vessel Connection - Cylinders 125,150, 210, 300

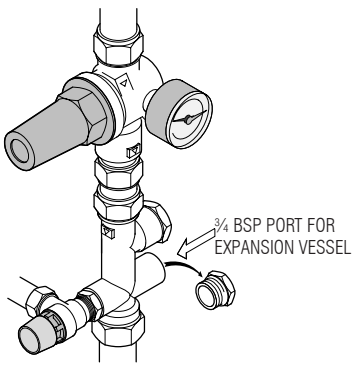


Fig. 4-2g Expansion Vessel Connection - Cylinders 500

4-2.5 Accumulator

The accumulator may be installed at any convenient location within the dwelling, outhouse, garage, loft or basement.

Note
As Dualstream is a sealed system, the pressure at the taps is not affected by the height of the cold water storage.

In normal circumstances the accumulator should be installed vertically. Where this is not possible accumulators up to 240 can be installed horizontally by supporting it in a cradle and ensuring provision is made to make it fully drainable.

The floor must give adequate support to the filled accumulator.

The accumulator must be protected from frost, particularly when it is sited in a loft, outhouse or garage.

Note that space is required to the top of the vessel to access the pressure valve.

Provision must be made to enable the accumulator to be drained when required.

IMPORTANT The accumulator is supplied at 2 Bar pressure. It is recommended to set the pressure at 1.5 Bar below the mains pressure with a minimum of 0.5/0.8 Bar - see 4-5 and 5-5.1.

4-2.6 Scale Protection

IMPORTANT All installations should have a scale protection device fitted and in areas known to have hard water, a water softening device is strongly recommended.

GAH recommend and promote the use of scale prevention devices and water softeners in areas that are known to have hard water. Installed correctly they prolong the life of equipment and help prevent lime-scale formation in the pipework. Water Softeners provide the advantages of soft water, as well as preventing scale build up on taps and shower heads.

GAH offer a range of quality Water Softeners, for information contact GAH Heating Products.

Water softeners and any mains fed system must be of adequate capacity and should be installed with suitably sized hoses to prevent any possibility of flow reduction.

The location and position of the scale protection device or Water Softener should be as the manufacturers recommendations.

4-2.7 Pipework

When all pipework has been installed, disconnect from the Dualstream components and flush all pipework thoroughly.

When connecting to existing pipework remove all unwanted components, create new pipe runs then flush thoroughly before connecting to the Dualstream components.

4-2.8 Dualstream Components

All Dualstream components and pipework are checked at the factory prior to dispatch, however always check the connections for leaks on commissioning as transportation and installation can cause joints to move.

4-3 Expansion Discharge

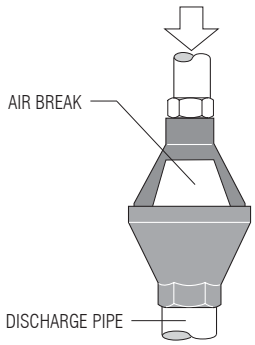


Fig. 4-3a Tundish

4-3.1 Tundish

The Tundish must be vertical and fitted within 500mm of the temperature and pressure relief valve and must be located with the cylinder. The tundish must also be in a position visible to the occupants, and positioned away from any electrical devices. The discharge pipe from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge and to be of metal.

4-3.2 Expansion Discharge - Self Sealing Valve

A Hepvo Self Sealing Valve is available as an option, this enables alternative discharge arrangements to be used, however its use and installation must be approved by the local building control.

4-3.3 Expansion Discharge Pipe - To Gully

See Fig.4-3b

Discharge pipes from the temperature TPRV and PRV may be joined together.

The pipe diameter must be at least one pipe size larger than the nominal outlet size of the safety device, this is adequate when the hydraulic resistance does not exceed that of a straight pipe 9m long.

Note
The TPRV and PRVs must not be used for any other purpose.

Bends must be taken into account in calculating the flow resistance.

Minimum pipe sizes are given in Table 1.

The discharge pipe must have a vertical section of pipe at least 300mm in length, below the tundish before any elbows or bends in the pipework.

The discharge pipe must be installed with a continuous fall.

The discharge must be visible at both the tundish and the final point of discharge, but where this is not possible or practically difficult; there should be clear visibility at one or other of these locations. Examples of acceptance are:-

1. Ideally below a fixed grating and above the water seal in a trapped gully.
2. Downward discharges at a low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc. These are acceptable providing that where children may play or otherwise come into contact with discharges, a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility.
3. Discharges at high level; i.e. into a metal hopper and metal downpipe with the end of the discharge pipe clearly visible (tundish visible or not); or onto a roof capable of withstanding high temperature discharges of water 3m from any plastic guttering systems that would collect such a discharge (tundish visible).
4. Where a single pipe serves a number of discharges, such as in blocks of flats, the number served should be limited to not more than 6 systems so that any installation can be traced reasonably easily. The single common discharge pipe should be at least one pipe size larger than the largest individual discharge pipe to be connected. If unvented hot water storage systems are installed where discharges from safety devices may not be apparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place. Note: The discharge will consist of scalding water and steam. Asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges.

WARNING
Scalding water and steam can be blown out of the discharge pipe. Position the discharge so that it is not a hazard to property or people (especially children).

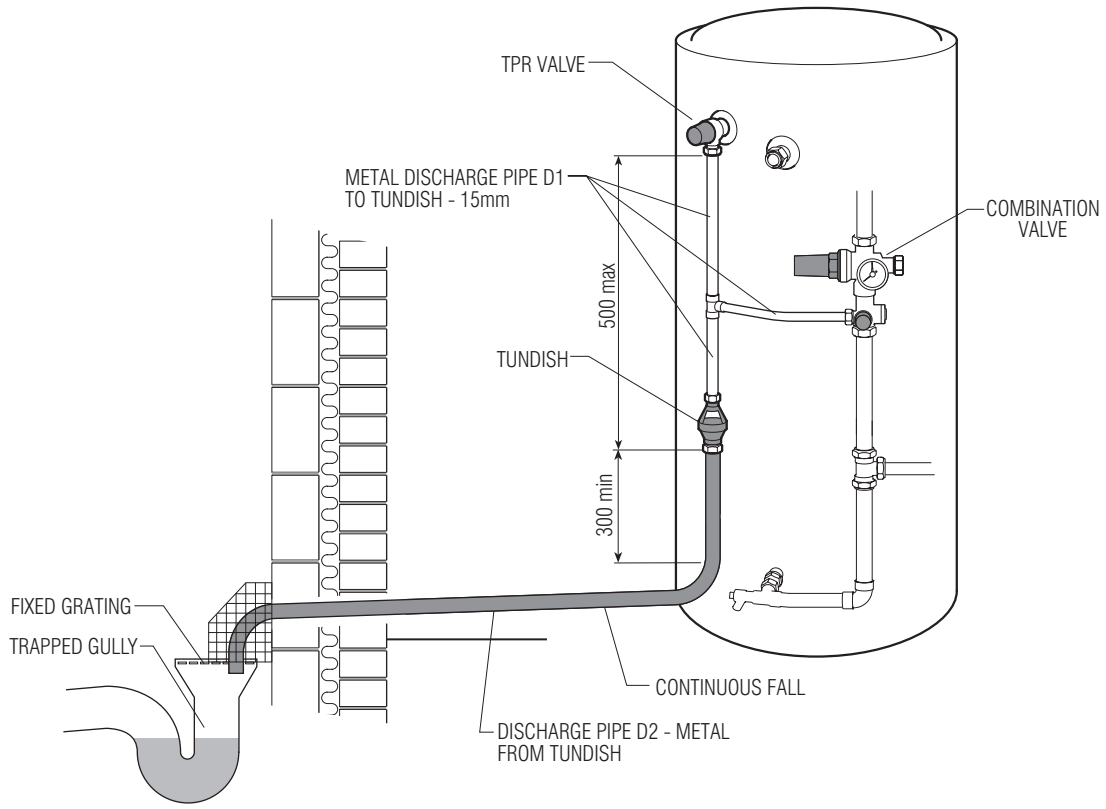


Fig. 4-3b Typical Expansion Discharge Arrangement

The equivalent hydraulic resistance of discharge pipework needs to be calculated where the length of **D2** exceeds 9m (maximum for one step up in pipe size) including resistance of elbows or bends. The following table can be used:

4-3.4 Hydraulic Resistance of Discharge Pipework - Table 1

Valve outlet size	Minimum size of discharge to Tundish (**D1**)	Minimum size of discharge pipe from Tundish (**D2**)	Maximum resistance allowed expressed as a length of straight pipe, i.e. no elbows or bends	Resistance created by each elbow or bend
G ½	15 mm	22 mm 28 mm 35 mm	up to 9 m up to 18 m up to 27 m	0.8 m 1.0 m 1.4 m
G ¾	22 mm	28 mm 35 mm 42 mm	up to 9 m up to 18 m up to 27 m	1.0 m 1.4 m 1.7 m
G 1	28 mm	35 mm 42 mm 54 mm	up to 9 m up to 18 m up to 27 m	1.4 m 1.7 m 2.3 m

4-3.5 Worked Example

G ½ temperature and pressure relief valve (TPRV) with a discharge pipe (D2) having four elbows and length of 7m from the tundish to the point of discharge.

From Table 1:-

Maximum resistance allowed for a straight length of 22mm copper discharge pipe (D2) from G ½ temperature and pressure valve is 9m. Subtract the resistance for four 22mm elbows at 0.8m each = 3.2m. Therefore the maximum permitted length equates to 5.8m - as 5.8m is less than the actual length of 7m therefore pipe D2 must be 28mm.

4-4 Larger Systems

For larger systems two or more accumulators and cylinders can be linked together.

For more information consult GAH (HEATING PRODUCTS) LIMITED.

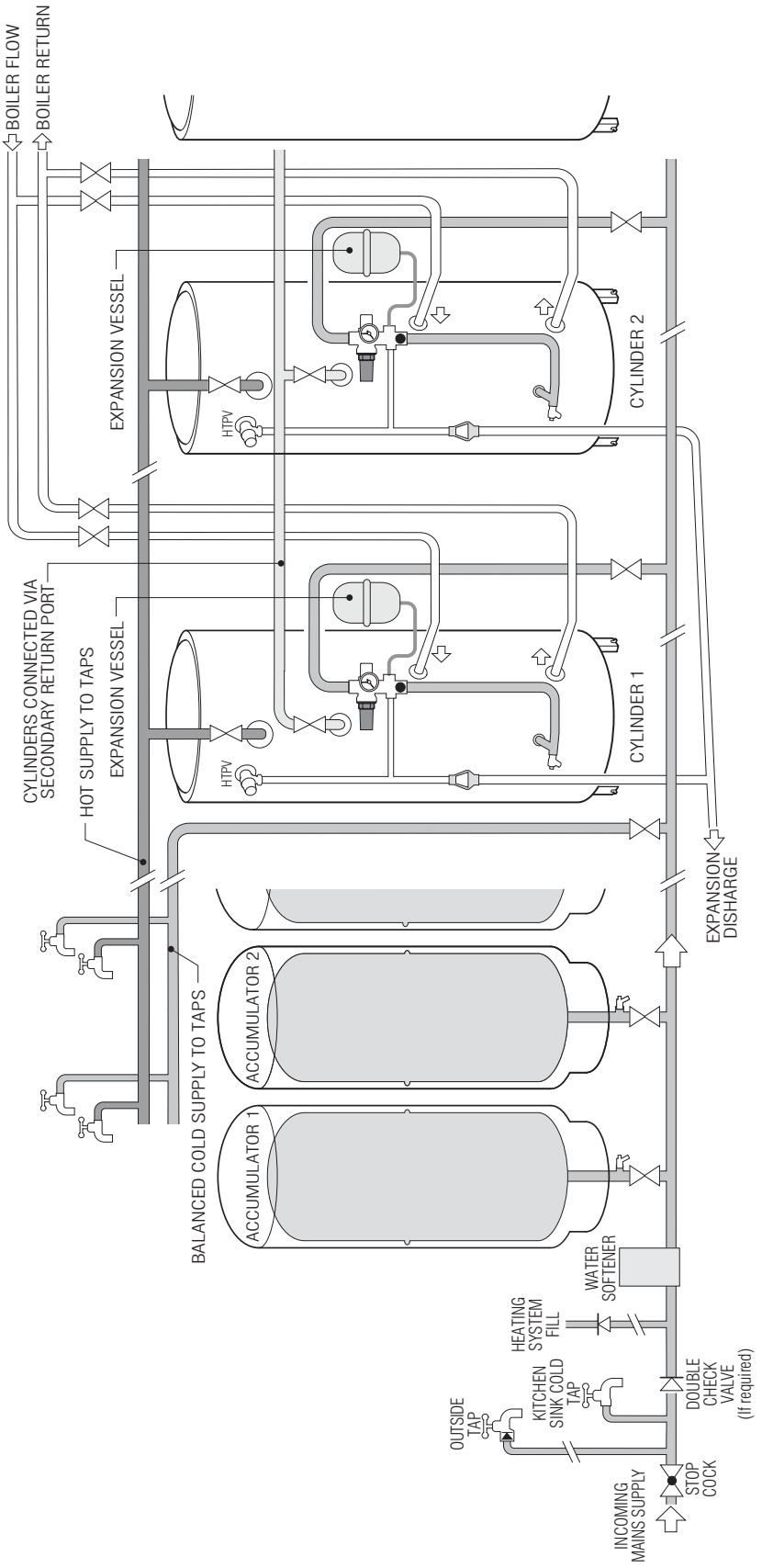


Fig. 4-4a Typical Multi System Layout

FOR REFERENCE ONLY

4-5 System Pressure

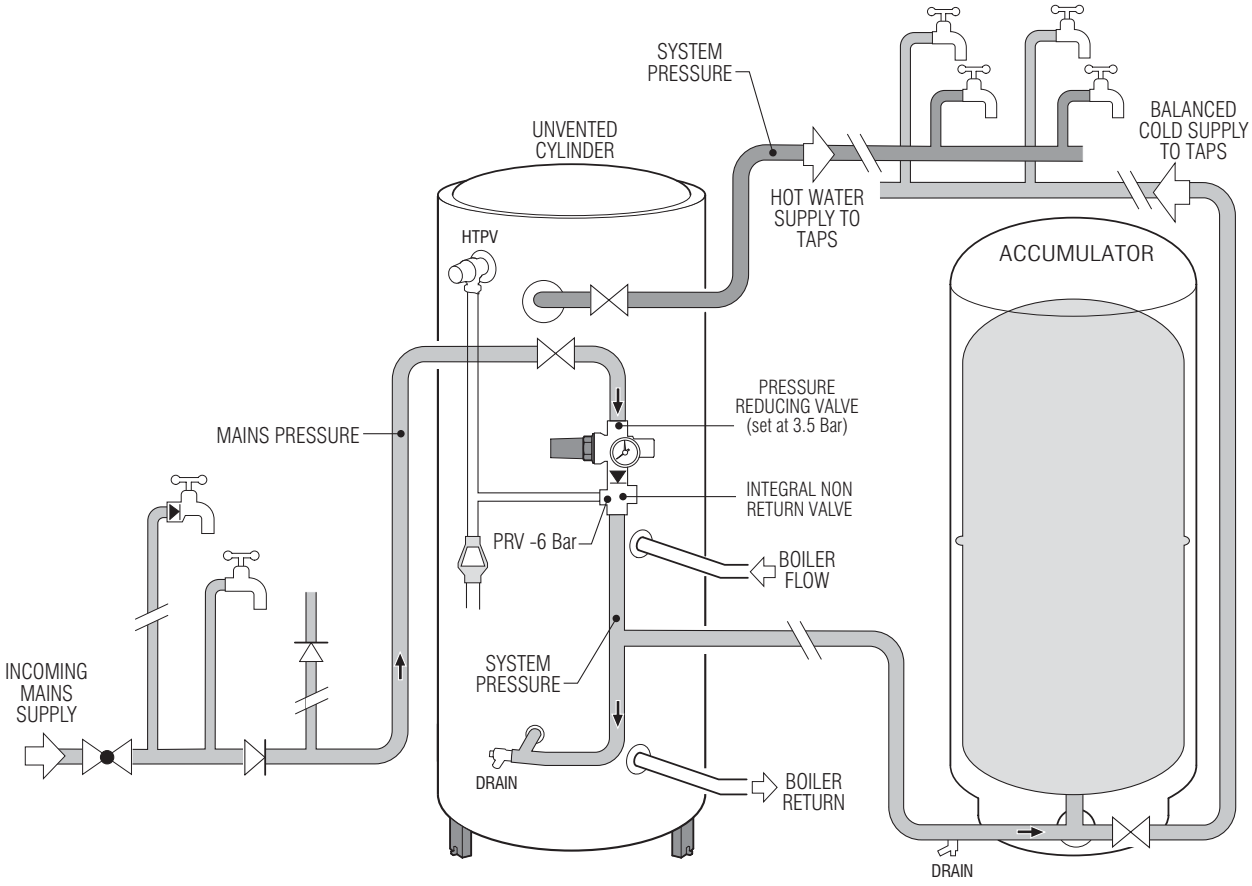
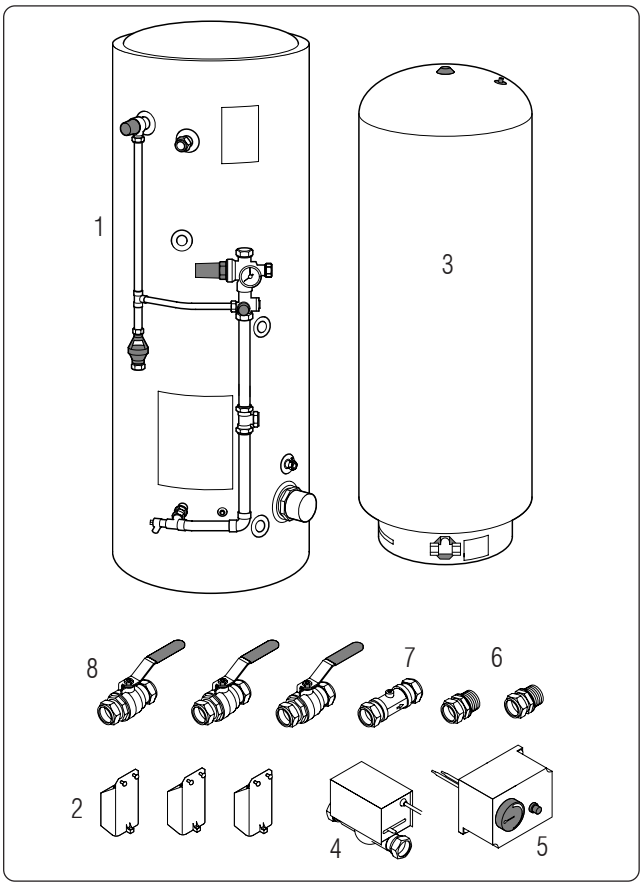


Fig. 4-5a Pressure Diagram

Notes on Pressures:-

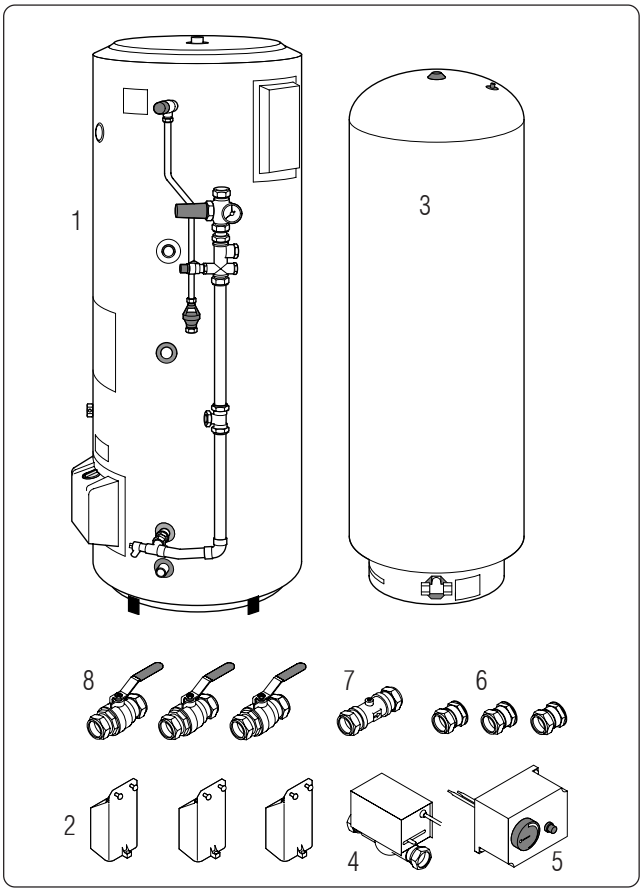
1. The additional pressure reducing valve is not normally required on standard systems.
2. The Combination Valve has an integral pressure reducing valve fixed at 3.5 bar therefore the System Pressure will be 3.5 bar maximum.
3. If the Mains Pressure is less than 3.5 bar then the System Pressure will be at maximum Mains Pressure.
4. The Accumulator Pressure is factory set at 2 Bar.
5. The recommended Accumulator Pressure is 1.5 Bar below the mains pressure with an absolute minimum of 0.5/0.8 Bar - consult GAH Heating Products for further information. Also refer to 5-1.1.
6. The Combination Valve has a Pressure Relief Valve (PRV) set at 6 Bar.
7. The unvented cylinder has a Temperature and Pressure Relief Valve (PRV) set at 6 Bar.

4-6 Parts Supplied



4-6.1 All models except 500

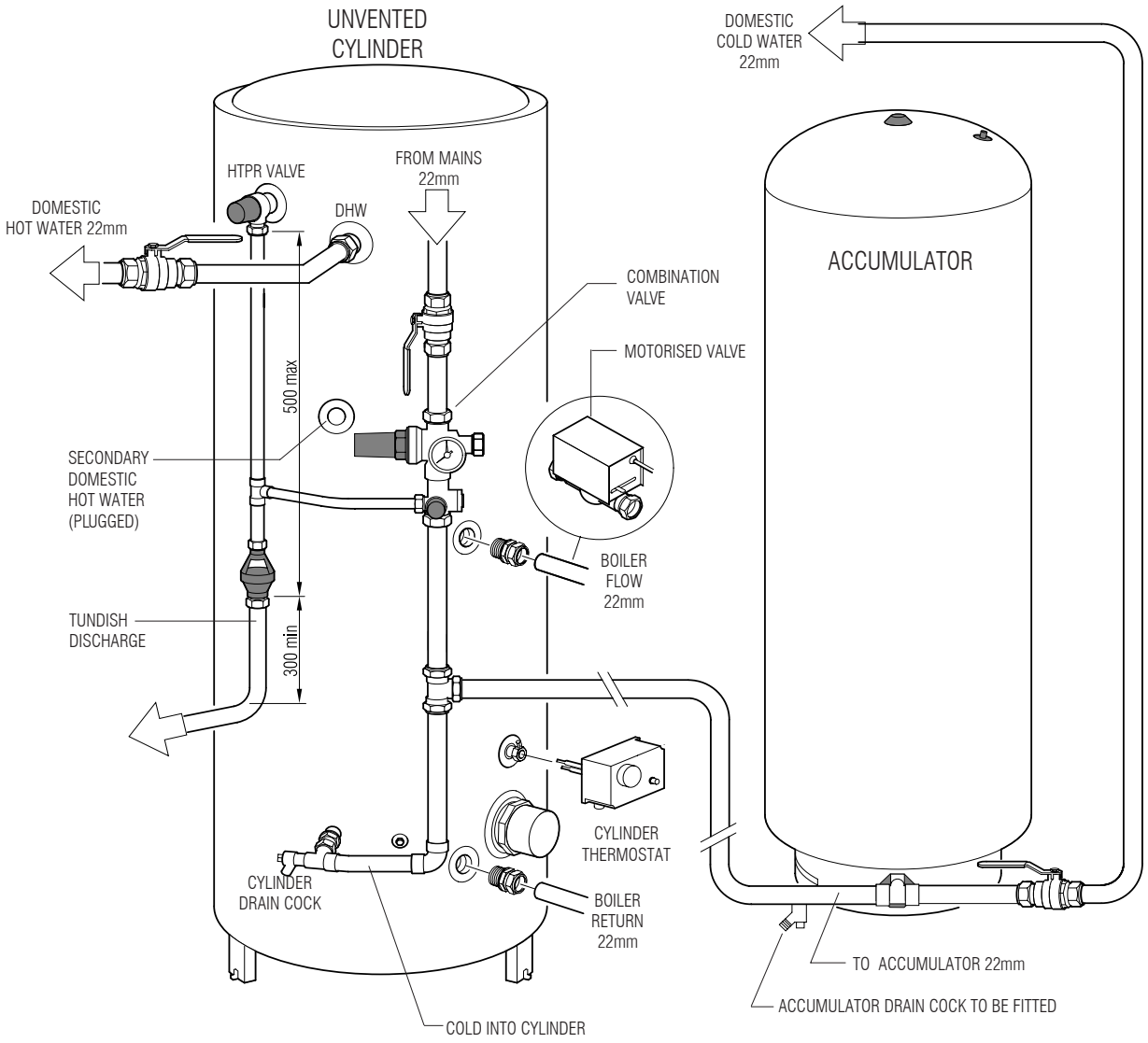
Item	Part	Qty	Notes
1	Cylinder	1	Pre-plumbed c/w Immersion Heater
2	Cylinder Feet	3	Complete with 6 screws
3	Accumulator	1	Pre-plumbed - 28mm compression
4	Motorised Valve	1	For boiler flow to cylinder
5	Cylinder Stat Thermal Overload Stat	1	For cylinder
6	M.I. Coupler 22mm x ¾"BSP	2	For cylinder boiler Flow and Return
7	22mm Single Check Valve	1	For incoming mains
8	22mm Ball Valves	3	1 for domestic hot water 1 for domestic cold water 1 for cold feed to the cylinder



4-6.2 500 Only

Item	Part	Qty.	Notes
1	Cylinder	1	Pre-plumbed c/w Immersion Heater
2	Cylinder Feet	3	Supplied fitted to Cylinder
3	Accumulator	1	Pre-plumbed -28mm compression
4	Motorised Valve	1	For boiler flow to cylinder
5	Cylinder Stat & Thermal Overload Stat	1	For cylinder
6	F.I. Coupler 28mm x 1"BSP	3	2 for cylinder boiler Flow and Return 1 for cold feed to cylinder
7	28mm Single Check Valve	1	For incoming mains
8	28mm Ball Valves	3	1 for domestic hot water 1 for domestic cold water 1 for cold feed to the cylinder

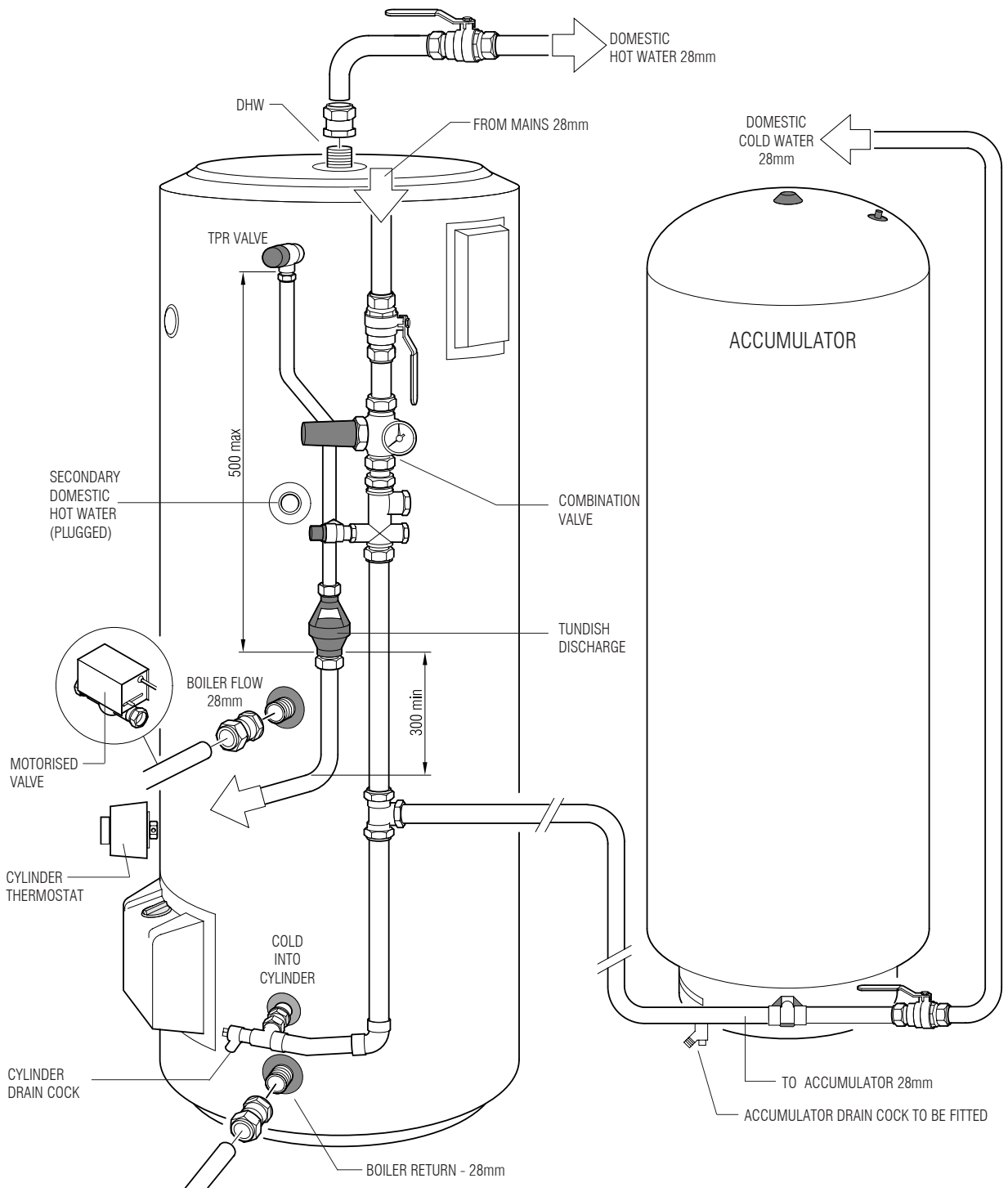
4-6.3 Connections to Dualstream - 125, 150, 210 and 300 Cylinders



Domestic Hot Water	22mm	Fit 22mm ball valve - supplied
Domestic Cold Water	22mm	Fit 22mm ball valve - supplied
Mains supply	22mm	Fit 22mm ball valve - supplied
Tundish	-	Discharge to be arranged and sized to comply with Building Regulations.
Boiler Flow	22mm	Indirect only
		22 x ¾ M.I. Coupler - supplied
		Fit Motorised Valve - supplied
Boiler Return	22mm	Indirect only
		22 x ¾ M.I. Coupler - supplied

Fig. 4-6a Typical Dualstream Connections

4-6.4 Connections to Dualstream - 500 Cylinder



Domestic Hot Water	28mm	Fit 28mm ball valve - supplied
Domestic Cold Water	28mm	Fit 28mm ball valve - supplied
Mains supply	28mm	Fit 28mm ball valve - supplied
Tundish	-	Discharge to be arranged and sized to comply with Building Regulations.
Boiler Flow	28mm	Indirect only 28 x ¾ M.I. Coupler - supplied Fit Motorised Valve - supplied
Boiler Return	28mm	Indirect only 28 x ¾ M.I. Coupler - supplied

Fig. 4-6b Typical Dualstream Connections

5-1 Commissioning Checks

IMPORTANT It is the responsibility of the installer to ensure that the Dualstream System is properly commissioned.
Should the commissioning not be carried out, then the manufacturers guarantee and any extended warranty, will become null and void.
The Guarantee Form MUST be completed and returned to GAH (HEATING PRODUCTS) in the prepaid envelope provided.

5-1.1 Commissioning Procedure

1. Check accumulator pressure is 1.5 Bar below the mains pressure - minimum 0.5 Bar.
2. Check the Tundish is correctly installed to conform to the Building Regulations G3.
3. Check all pipe connections are tight and no joints have been left unsoldered.
4. Check ALL drain cocks are closed.
5. Check ALL wiring connections have been made.
6. Check the required earth continuity conductors have been fitted.
7. Check the Immersion Heater has its cover and gasket fitted and is tight in the cylinder.
8. Check the Immersion Heater is set to 60°C.
9. If fitted, check that the Scale Protection device or Water Softener has been fitted according to manufacturers instructions.
10. Open all shut off valves.
11. Turn on Mains Stop Cock and allow the system to fill.
12. Open all domestic taps in turn to purge air.
13. Check system for leaks including around the Immersion Heater.
14. Check the installation of the tundish complies with the Building Regulations.
15. Check no water is discharging from the Pressure Relief Valve or the TPR valve, this will be evident at the Tundish.
16. Test the operation of the TPR Valve by turning the manual test cap and ensure the water flows freely and safely to waste.
17. Test the operation of the Combination Valve by turning the manual test cap and ensure the water flows freely and safely to waste.
18. Set Cylinder Thermostat to 60°C (not required on 500 Cylinders).

The Boiler and heating system should be checked before continuing.

19. (Indirect) Check heating system has correct type of motorised valve fitted and wired correcly to the cylinder flow.
20. Set Motorised Valve to Manual, open and allow the heat coil to fill.
21. Set the Motorised Valve to Auto.
22. Switch on the heating system.
23. Wait for the system to heat up.
24. Check temperature of hot tap water max. 60°C.
25. Check operation of cylinder thermostat. When turned down below tank temperature the motorised valve should open. When turned up above tank temperature the motorised valve should close.
26. Check for leaks again when the system is up to temperature.
27. Fill in details in the Benchmark Logbook.

5-1.1 Accumulator Pressure

Accumulators are supplied by GAH with a preset air charge of 2 Bar (28/30psi). The Combination Valve supplied with the Dualstream system has an integral pressure reducing valve fixed at 3.5 Bar. Therefore there is a pressure differential of 1.5 bar between the system pressure and the air charge of the Accumulator.

When the incoming mains pressure is less than 3.5 Bar the pressure differential will be higher than 1.5 Bar and the Accumulator will not fill sufficiently, therefore it may be necessary to lower the Accumulator air charge pressure.

The procedure for changing the Accumulator pressure is given below, this can be done before the system has been filled. It may be done after the system has been filled and tested, providing the incoming main has been turned OFF and the water drained from the Accumulator. Failure to do this may result in false pressure reading and damage to the butyl diaphragm.

If mains pressure is 3.5 Bar or above changing the Accumulator charge pressure will not be necessary.

CAUTION
The main supply must be turned OFF and water drained from the Accumulator before lowering the charge pressure, failure to do so could result in damage to the diaphragm.

Adjusting Air Pressure

1. Record mains pressure.
2. Turn main supply OFF.
3. Turn on cold outlets to empty Accumulator.
4. Remove black cap from top of Accumulator check/confirm Accumulator pressure with pressure gauge.
5. Lower air charge so that is 1 to 1.5 Bar below mains pressure. Minimum Accumulator pressure is 0.5 bar to 0.8 Bar.

Also refer to 4-2.5 and 4-5.
If in doubt consult GAH Heating Products.

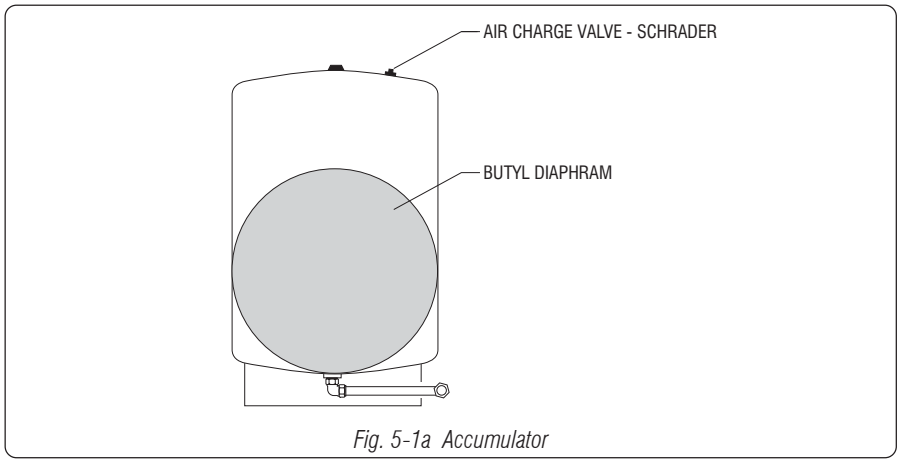


Fig. 5-1a Accumulator

5-2 Handing Over

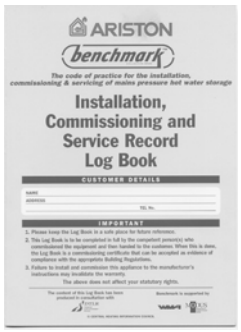
Complete the Guarantee Form, the top sheet of this MUST be sent to GAH (HEATING PRODUCTS) LIMITED. Complete the Benchmark Logbook.

The Installer should re-check the system and ensure it is completely satisfactory before demonstrating to the householder. The householder should be aware of the following:-

1. How to set the temperature of the tap hot water.
2. The function of the Pressure Relief Valve and Combination Valve and that over pressure will cause steam and scalding water to be emitted from the discharge pipe.
3. The Tundish is supplied as a visual identification for over pressure.
4. The procedure to follow in the event of over pressure. Refer to 2-5.

This manual and supplements must be left with the householder together with a copy of the completed Guarantee Form.

6-1 Routine Service



IMPORTANT
Also carry out any service requirements of specific components as specified by the manufacturers instructions.

Note
If heavy scaling is evident then descaling the system is recommended. Ensure system is fully flushed following descaling.

The Dualstream system should have a routine service at least once in 12 months.

IMPORTANT Always turn off the heating system and electricity supply to the Dualstream before working on the Dualstream System.

6-1.1 Service Procedure

1. Confirm with customer service history and locate Benchmark Logbook.
2. Check cylinder model and serial number is listed in the Benchmark Logbook.
3. Visually inspect cylinder/s for damage, metal failure and signs of leaks.
4. Visually inspect accumulator for damage, metal failure and signs of leaks.
5. When applicable visually inspect expansion vessel and its pipework for damage, metal failure and signs of leaks.
6. Visually inspect all Dualstream pipework for damage, metal failure and signs of leaks.
7. Record mains pressure and system pressure.
8. Turn the Heating System OFF.
9. Turn the electrical supply to the Dualstream OFF.
10. Momentarily open the combination TPR Valve and check that the water drains freely and safely to and from the tundish.
11. Open cylinder TPRV for 15 seconds and close, valve should shut off. Repeat if valve sticks. If valve will not shut off replace valve.
12. Open combination PRV for 15 seconds and close, valve should shut off. Repeat if valve sticks. If valve will not shut off replace valve.
13. Close the Stop Cock.
14. Open the hot and cold taps, attach a hose to the cylinder and accumulator drain cocks and empty the system.
15. Check the pressure of the accumulator, this should be 1.5 Bar below the mains pressure with an absolute minimum of 0.5/0.8 Bar.
16. Remove Immersion Heater, remove limescale and examine the element.
    In hard water areas it is probably better to replace the Immersion Heater if heavily scaled. Refit Immersion Heater with gasket.
17. Most glass lined cylinders will have at least one magnesium anode, remove and inspect all anodes, replace if required.
18. Clean and check the line strainer in the combination valve - replace if required.
19. Check and clean the expansion relief valve in the combination valve - replace if required.
20. Close all drain cocks and refill system.
21. Check that no water is passing through the Combination Valve or the Pressure Relief Valves, this will be evident at the Tundish.
22. Switch on the heating system.
23. Check operation of motorised valve by setting heating system to call for hot water. The valve should open. Then turn hot water off - the valve should close.
24. Wait for the system to heat up.
25. Check temperature of tap water adjust as required, max. 60°C.
26. Check operation of cylinder thermostat. When turned down below tank temperature the motorised valve should open. When turned up above tank temperature the motorised valve should close.
27. Check for leaks again when the system is up to temperature.
28. Enter details of service into the Benchmark Logbook.

7-1 Fault Finding - also see www.gah.co.uk

No COLD Water Supply	1. Check the mains supply has not been interrupted from the main. 2. Check the stop cock and all valves on the mains supply are correctly installed. 3. Check the stop cock and any valves on the mains supply are fully open.
Reduced Pressure	1. Check the stop cock and any valves on the mains supply are fully open. 2. Check the combination valve line strainer is not blocked - clean if required. 3. Check line strainers and any other fittings are not blocked - clean if required.
No Hot Water	1. Check there is power to the indirect heating system/boiler and/or the cylinder immersion heater. 2. Check fuses for indirect heating system and/or the cylinder immersion heater. 3. Check cylinder thermostat is installed and set correctly.
Water Leaks	Please consult your installer. In the unfortunate event of a water leak from the Dualstream cylinder or accumulator, TURN OFF ELECTRIC SUPPLY, then turn off the mains water supply to the house via the stop cock. Make allowance to store some cold water for necessities. Open both cold and hot taps to drain the cylinders of water thus preventing any further leaks and consult your installer.
Poor Flow Rate at Taps	1. Check to ensure combination valve filter is not blocked. 2. Check all isolation valves are fully open. 3. Check accumulator charge pressure is not too high - refer to 4-4. 4. Check pipework from accumulator is of adequate size.
Good volume which falls away too quickly	1. Check accumulator charge pressure is not set too high. Re-set pressure as section 4-4.
Cold water discoloured	1. Check to make sure there is air in the accumulator. If air is not present, suspect faulty accumulator, consult GAH (HEATING PRODUCTS). 2. Check mains supply - it may have been interrupted. 3. Check water softener (when fitted) is operating correctly.
Hot water discoloured	1. Indirect cylinder coils may be fractured, consult GAH Heating Products.

Notes

dualstream water control

heating products

GAH (Heating Products) Ltd.
Building 846,
Bentwaters Parks,
Rendlesham,
Woodbridge,
Suffolk IP12 2TW

www. gah.co.uk

Tel: 01394 421160
Fax: 01394 421170

email: mail@gah.co.uk